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ABSTRACT

This final report describes a 3-year project which investigated the relationship between academic learning time (ALT) and achievement in reading and mathematics of mildly handicapped students within the context of different special education delivery systems. Subjects were 24 educably mentally retarded, learning disabled, and emotionally disturbed students, aged 7-13 years, in grades 1-5. During the first one and a half years, descriptive data were collected to determine the amount and kinds of ALT to provide. During the last one and a half years, interventions based on the results were carried out and evaluated. The relationship of increased direct instruction to increased academic engagement was reported as the most dramatic overall ALT finding. Section 1 of the document consists of the text of a teacher's manual summarizing the research findings and suggesting strategies for increasing ALT and student academic achievement. Sections 2, 3, and 4 present a review of the literature, a summary description of project activities and methodology, and results and discussion. In section 5, conclusions and limitations are discussed, and questions for further research are posed. Appendices include: (1) Academic Learning Time Observation System (ALTOS) coding forms; (2) ALTOS Observer Reference Manual; (3) ALTOS Reference Manual for Teacher Logs; (4) sample teacher printout and directions; and (5) source listing of BASIC programs. (JW)

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FINAL REPORT

Department of Education Grant No. G008001876

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AN ANALYSIS OF THE IMPACT OF INSTRUCTIONAL TIME WITHIN DIFFERENT SERVICE DELIVERY SYSTEMS ON THE ACADEMIC ACHIEVEMENT OF MILDLY HANDICAPPED CHILDREN

CENTER FOR INNOVATION IN TEACHING THE HANDICAPPED

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TABLE OF CONTENTS

Introduction..1

Section 1, Teacher's Manual...3

Section 2, Review of the Literature.............................32

Section 3, Summary of Project Activities......................42

Section 4, Results..60

Section 5, Summary of Conclusions and Dissemination Efforts......135

References..141

Appendices

Appendix A, Altos Coding Forms

Appendix B, Altos Observer Training Manual

Appendix C, Altos Teacher Log Manual

Appendix D, Sample Teacher Printout and Directions

Appendix E, Source Listing of Basic programs

Appendix F, ALT Teacher's Manual

INTRODUCTION

A positive relationship has been reported between the amount of academic learning time (ALT) and academic achievement of normal students in regular classroom settings. There has been a dearth of data prior to the present study, however, indicating whether this relationship exists for handicapped children. This project investigated the relationship of academic learning time and achievement in reading and mathematics of mildly handicapped students within the context of different special education delivery systems. Academic learning time includes the amount of instructional time allocated to reading and mathematics, the amount of time in which students are engaged during the allocated time, and the degree of student task success when engaged.

During the first one and a half years of the project, descriptive data were collected to determine the amount and kinds of ALT provided to mildly handicapped students and its relationship to student achievement in reading and mathematics in self-contained, resource room, and mainstream settings. During the last one and a half years interventions based on the descriptive results were carried out and evaluated in terms of their success in increasing the ALT of mildly handicapped students, as well as their academic achievement. Near the end of the project, a teacher's manual was prepared which summarized the effects of various teaching strategies on the ALT and achievement of mildly handicapped students.

Overview of This Report

SECTION 1. This section of the report contains the manual written for special education teachers (and administrators) summarizing the findings from the present study and others. Although the language of the manual is intentionally non-technical, it does present a relatively brief summary of research findings and their implications for educational practice. Sections 2, 3 and 4 then detail the relevant literature, project activities and results of data analysis.

SECTION 2. A review of the literature on the relationship of ALT and academic achievement of normal children is presented. Since there were no data on the nature of this relationship concerning mildly handicapped children when this study began, this literature review served as a basis for identifying variables and methodologies considered important in designing the present study.

SECTION 3. Instrumentation and methodologies of data collection are discussed along with a summary description of project activities over its three year duration.

SECTION 4. Results of data analysis are presented and discussed in considerable detail in this chapter.

SECTION 5. Conclusions from this study are reiterated, its limitations are indicated, and questions for further research are suggested.

SECTION 1

TEACHER'S MANUAL

TEACHING STRATEGIES FOR INCREASING ACADEMIC LEARNING TIME AND STUDENT ACADEMIC ACHIEVEMENT

INTRODUCTION

Recently, a substantial number of educational studies have sought to identify activities which significantly impact on student achievement. The results of these studies have produced virtual universal agreement that Academic Learning Time (ALT) is one of the most significant determinants of student achievement. ALT refers generally to the time students spend actively engaged in academic tasks which they complete with high success. It contains three components that have been found to be highly related to student achievement: 1) Amount of time allocated to instruction, 2) Amount of time that students are actually engaged in academic activities, and 3) Amount of time that students are engaged in academic activities completed with high success.

Allocated time. The amount of time allocated by a school district and/or a teacher for instruction has been found to be an important predictor of student achievement. Some studies have demonstrated that the length of the school day and the length of the school calendar influence student achievement. Other studies have found that the more time that a teacher allocates to a subject matter area, the greater the level of student achievement. Further studies have systematically examined the amount of time that is actually allocated for instruction in typical classrooms. The results indicated that in selected second grade classrooms 57% of the school day was allocated to academic activities, with 24% devoted to non-academic subjects such as music, art, affective and physical education, and the remaining 19% was spent in transitional activities. Fifth grade pupils had 60% of their time allocated to academic activities, 23% to non-academic activities, and 17% to transitional activities. This information suggests that room exists for increasing the amount of time that is allocated for instruction. We also know that, should this occur, it is likely that student achievement will increase.

Engagement time. The second component of ALT is the proportion of allocated time that students are actively engaged in academic tasks. Student engagement time was found to be even more highly related to student achievement than allocated time. These results suggest that students who pay attention to and work more on academic tasks are also those who learn more. Studies that have examined the amount of time that students are engaged during the school day have reported results ranging from 40 to 80%. Information reported by most authorities suggests that at least 80% engagement is optimum for most students.

Success time. The final component of ALT is student success rate on academic tasks. Studies have clearly indicated that the more time that students spend on tasks which they complete with high success, the greater their level of achievement. These studies reveal that pupils who spend more than half of their time on high success tasks (i.e., tasks on which students attain accuracy scores of 80% or higher) also attain higher achievement test scores, maintain their knowledge longer, and have more positive attitudes toward learning. Such results suggest that learning basic skills in the elementary grades requires students to experience success on assigned tasks and to thoroughly master skills.

Academic success and skill mastery depend very heavily upon accurate instructional programming. Studies have demonstrated that high student achievement is related to teacher ability to accurately assess students' academic skills and to provide appropriate and adequate instructional activities. Although, on the surface, this observation represents nothing new--practicioners have forever diagnosed students' needs and prescribed instruction--successful results depend on the manner in which the assessment, programming and instruction are conducted. The most compelling evidence indicates that, to maximize a student's success on a particular academic task, a teacher should first assess a student's ability to perform the task, provide materials or procedures to directly teach it, and then regularly monitor student progress on the task. Such systems provide feedback to students regarding their performance, as well as to the teacher concerning the effectiveness of the instructional programs.

Question: Given the above information, what can you as a teacher specifically do to increase the academic achievement of the students in your classroom? Answer: Read the subsequent sections of this manual for specific suggestions on how to increase student academic achievement.

TEACHING STRATEGIES THAT INCREASE STUDENT ACADEMIC ACHIEVEMENT

What can you, the teacher, do to increase student academic achievement in your classroom? Studies conducted in thousands of classrooms in the U.S. have identified a number of specific things that more effective teachers do that are associated with greater academic achievement:

- Spend more time on academic subjects,
- Evoke more student attention to academic tasks,
- Provide more direct academic instruction,
- Provide more academic activities in which students experience high task success.

In many ways these four areas overlap and are interrelated. But the message is clear from the educational studies over the last decade: What is not taught and attended to in academic areas is not learned. Teachers who are task oriented and determined that their students learn are more effective.

We now want to discuss in concrete terms what it is that these effective teachers do. Hopefully, none of these recommendations will surprise you. As you read, think about your classroom and students. Ask yourself, "How many of these things do I frequently do in my classroom? What could I do differently that would increase my teaching effectiveness?"

SPEND MORE TIME ON ACADEMIC SUBJECTS

Your immediate response may be, "But my daily schedule is already full. How can I allocate more time for academic subjects?". Before we try to answer this question, consider this: Studies show that the more time spent and the more content covered in a subject matter area, the more students achieve in that content area. This should not be surprising. But what is surprising is the tremendous variability in the amount of time that teachers allocate to various content areas. In some elementary classrooms, for example, students were observed to spend an average of less than one minute per day in reading instruction, compared to other classrooms where students spent an average of more than two and a half hours per day! Sounds incredible, but that's what was observed. Of course, these are extreme cases.

One strategy for allocating more time to academics is for a teacher to look at the difference between scheduled time and allocated time. For example, a teacher may schedule math from 11:00 a.m. to 11:40 a.m. each day (40 minutes per day). However, by the time the kids arrive from their physical education class and get settled, the math activity doesn't really get started until about 11:10. Subtract 10 minutes. During the lesson, several students become disruptive and start pencil jabbing. The teacher stops them and interrupts the class to give a short lecture on the dangers of pencil jabbing. Subtract 5 more minutes. Then, by about 11:30 most of the students have finished the math assignment. The teacher tells them, "Since it's so close to lunch time, you have 10 minutes of free time." Subtract 10 more minutes.

In this example, which is probably not atypical, forty minutes were scheduled for math, but only 15 minutes were actually spent in math instruction. This example also illustrates three causes of decreased instruction time:

1) Time spent in transition between activities,

2) Time spent disciplining or managing student misbehavior,

3) Time students spend waiting during a scheduled activity.

Without changing your schedule, you can increase time spent in academic content areas by decreasing total transition time, student misbehavior and student wait time. You can also increase time spent in specific academic content areas by scheduling more time for those subjects.

1. Transition time. In our studies we found that students spent an average of about 45 minutes per day in total transition time. This is the time that accumulates during the school day between the end of one activity and the beginning of the next activity. In some classrooms there was as little as 25 minutes of transition time on a given day, and in others as much as 90 minutes. Of course, some transition time is inevitable.

PROJECT ONE: Here's a little project for you to do: Make a copy of your weekly schedule of activities, including lunch, recess, collecting lunch money, taking attendance, etc., as well as the usual subject areas such as reading, spelling, math, science, social studies, art, music, and P.E. For one week, write down on your schedule the exact clock times that each activity actually begins and ends. An activity begins when your students actually start dealing with the directions or substance of the learning activity. Likewise, an activity ends when your students actually stop dealing with the content of the learning activity. Keep a record of these activity start and stop times for a week. At the end of the week, add up the time intervals between activities (i.e., transition time). Divide by five to get the average amount of transition time per day.

If you're like most teachers when you complete PROJECT ONE, you may be surprised at how quickly transition time accumulates. Think of it this way: If you can decrease transition time by 15 minutes per day, then over the course of a 180-day school year, you will have 45 more hours to spend on instruction.

How can you reduce transition time? There are many ways. Here are two:

Make sure that all necessary lesson materials and supplies are assembled beforehand and are near at hand for both you and your students.

Start an activity promptly. Don't wait for stragglers. At first some "foot draggers" may miss out on the beginning of a lesson, but they'll soon get the message that you mean business.

Some teachers feel that transitions between activities provide respite for students--i.e., "break time". We agree that some break time is necessary, since it is unrealistic for students to concentrate continuously all day long. In elementary schools, morning and afternoon recesses and lunch help fulfill the need for break time. However, when the transition time between school and classroom activities which accumulates during the day becomes greater than the time spent on an important academic subject area, a teacher should evaluate ways of reducing transition time and increasing instructional time.

2. Time spent disciplining. Obviously, the more student off-task behavior there is, and the more time you need to spend disciplining or managing it, the less time there is available for instruction and learning. There are hundreds of methods of dealing with misbehavior, but research has not shown any method to be always superior to all others. In a famous study by Jacob Kounin, he discovered that the specific type of classroom behavior management technique was not nearly as important as its correct targeting and timing. He coined a term, "withitness", to describe teacher disciplining which has correct targeting and timing. Withitness promotes high student task involvement and minimal misbehavior. Teachers who are "withit" continually monitor their classrooms for potenti-

al behavior problems, and they communicate to their students that they know what's going on. If there is a misbehavior, a "withit" teacher correctly identifies misbehaving students (correct targeting) and deals with it immediately (correct timing).

Teachers who make target errors may discipline the "wrong" student (one who is innocent, an onlooker, or an imitator), or deal with a less serious misbehavior when a more serious misbehavior is occurring. A timing error occurs when the misbehavior "spreads" to other students or increases in seriousness before the teacher does something about it.

Thus, one effective way to minimize student misbehavior is to be "withit" in classroom behavior management. When less student misbehavior occurs, more time can be spent on the content of the lesson.

Another method, which has successfully increased the amount of appropriate student behavior and diminished inappropriate behavior, is to praise students periodically for paying attention and for behaving appropriately. For example, a teacher might periodically look around the classroom while conducting a reading group to identify and verbally praise students who are behaving appropriately. This practice has two distinct advantages. First, it provides teacher attention to students who are behaving appropriately, thus reinforcing that behavior, and secondly, those students are presented as socially acceptable models for other members of the class to emulate.

3. Time students spend waiting. In our study students were observed to spend an average total of about 19 minutes per day waiting during activities. This means that they were either finished with their work early, or they could not continue working because they were waiting on the teacher or someone else in order to continue. Over the course of a 180-day school year, that adds up to

approximately 55 hours spent waiting. Note that wait time does not include time spent in transition between activities.

Of course, some student waiting is inevitable. For example, if a student is stuck on an assignment and needs help, it may be serveral minutes before you can get free to help that student. On the other hand, when some students finish an assignment early, you can simply prepare in advance similar additional work for those faster working students. You could have a folder or file of "bonus" assignments or "challengers" that students know they can do if they finish the original assignment early. If possible, these extra tasks should be clearly related to the objectives of the original assignment.

Another common example of student wait time occurs when elementary students stand in line at the teacher's desk waiting to get their papers graded. A couple of ways you can decrease this kind of wait time is to: 1) Provide answer sheets so that students can correct their own papers after they are finished. 2) Correct papers afterwards as a group activity (and you can spot check answer sheets occasionally). Students can exchange papers if you're concerned about cheating. Needless to say, these strategies will not be suitable for some assignments, but you can decrease wait time using these strategies on assignments which are suitable.

4. Scheduling. You should not overlook the possibility of scheduling more time for certain kinds of academic activites. Of course, there will be trade-offs in time scheduled for other activities, since the total amount of time per day is fixed by school hours. For example, scheduling 10 more minutes per day for reading instruction adds up to 30 extra hours of time allocated to reading over the course of a school year. You might think that, when allocated time is increased, student attention will tend to decrease. Studies have shown, however, that this does not generally happen. When time allocated to a particular content

area is increased, total student engagement time in that content area also increases.

Another way to beef up your schedule is to include, for example, more reading, writing, and math related activities in other subject areas, such as science and social studies. Students can get practice in the basic skills while they are learning other content as well.

Summary. You can increase the amount of time spent in instruction on academic content areas by:

- Reducing transition time between activities,
- Decreasing student misbehavior and time spent disciplining,
- Decreasing student wait time during activities,
- Increasing time scheduled for those content areas.

EVOKE MORE STUDENT ATTENTION TO ACADEMIC TASKS

Even though you have maximized allocated instructional time, some students may have relatively low task engagement rates. For example, Jimmy may pay attention about 60% of the time, whereas Sally is usually on-task 80% of the time. These task engagement rates are not uncommon. On the average, most students pay attention to academic learning activities between 70 and 75% of the time.

Studies have shown that increased student engagement time in academic content areas is associated with greater achievement in those areas. Again, it doesn't take long for small differences in daily engagement time to add up. For example, suppose you have scheduled and spend 90 minutes in reading instruction per day. If a student is engaged 70% of the time, his/her engagement time in reading is 70% X 90 minutes, or 63 minutes per day on the average. If that same student were to increase his/her engagement rate to 80%, then total engagement time would be 72 minutes per day. You may say, "Nine more minutes of student engagement per day doesn't sound like much." But consider that this is equivalent to 27 more hours of student engagement time in reading over the course of a school year. Looking at it another way, at a 70% engagement rate, about 5 extra weeks of school would be required to equal the total amount of engagement time a child would accrue at an 80% engagement rate during the normal school year.

What can you do to increase student attention? Of course, some factors are often beyond your direct control, such as student motivation to learn, student fatigue (due to not enough sleep, poor diet or health, low blood sugar), the humidity and temperature in the classroom, etc. There are other things you can control, however:

- Praising students for appropriate behavior,
- Being "withit",
- Doing more groupwork and providing more direct instruction,
- Providing a variety of learning tasks,
- Supervising seatwork activities more closely.

Praising students for appropriate behavior. Many studies have demonstrated that teacher praise provided to students who are working diligently on their assignments served to increase student engagement. This technique was found to work even more effectively when it was combined with ignoring off-task behavior. Later studies found that the positive effects of this technique also spilled over to students seated adjacent to the target students. Unfortunately, this technique is frequently overlooked because of its simplicity. But the point remains that it has been found to be one of the most effective techniques for increasing student engagment. In addition, many other studies have been conducted that demonstrate that point systems are very effective devices for increasing student engagement.

Being "withit". As discussed above, teachers who are more "withit" have classrooms whose students are on-task a greater proportion of the time and misbehave less often. Being "withit" means that you have "eyes in the back of your head" and communicate to your students that you are aware of what each student is doing. A "withit" teacher deals with off-task student behavior with correct targeting and timing. A positive form of "withitness" is to be aware of students who are actively engaged with the task, and praise those students. Studies have shown that teachers have been able to successfully increase student task engagement rates by regularly scanning their classrooms (e.g., once every five minutes), identifying those students who are on-task, and then providing some kind of reinforcement to those students.

Doing more groupwork. Studies have shown that students generally pay more attention during teacher-led group activities, compared to independent seatwork activities. We believe that the major reason for this increased student engagement is that more direct instruction is usually provided during teacher-led group activities. In our study we found that any given student was on-task an average of 95% of the time when direct instruction was being provided--either specifically to that student, to another student in the group, or to the group as a whole. On the other hand, when no direct instruction was being provided to the student or group including the student, s/he was engaged about 58% of the time on the average. Another way of looking at this, students were 8 times more likely to be off-task when no direct instruction was being provided, compared to their off-task behavior when there was direct instruction. Direct instruction includes teacher feedback, questioning, explaining, and structuring/directing. More will be said about direct instruction in a later section.

Studies have indicated that 30 to 40% of the time is typically devoted to teacher-led group activities at the elementary level, and about 60 to 70% of the time is spent in independent seatwork activities. Thus, one way to increase student attention is to schedule more group activities and therefore less independent seatwork. If you do more group activities, you will automatically increase the amount of direct instruction that you provide. This will result in increased student attention and, in the long run, greater gains in academic achievement.

A concrete way to go about increasing the number of group activities is to consider one activity per day that you have scheduled for seatwork (e.g., a language arts or math worksheet). Then, think of a practical way to convert that seatwork content into a group activity. By doing just one more group activity per day (and one less seatwork activity), we have estimated that total engagement time per student would increase by about 21 hours over the course of a school year--that's just for one more 20-minute teacher-led group activity per day.

Several caveats are in order here: First, increasing groupwork does not imply that seatwork should be excluded. Students obviously do need time to work by themselves at their own pace during certain stages of learning. Second, student skill levels must be taken into account in groupwork. If the students in the group are too divergent in their skill levels, doing an activity in one large group may be counterproductive, and it may be best to group students according to ability and instruct them in a group, while students who could not profit from this type of instruction are assigned seatwork. Third, it is worthwhile to consider the reasons why students are off-task more often during seatwork. Part of their inattention can be attributed to the nature of teacher supervision of seatwork. (More will be said about this in a later section.) A more important reason may be that the tasks required during seatwork may not be very interesting to students or instructions are unclear. Much seatwork at the elementary level consists of worksheet or workbook activities. In effect, this format requires that students do a great deal of "pencil pushing". It may be worthwhile to consider other kinds of independent seatwork formats besides worksheets.

Providing a variety of learning tasks. More variety of activities during a lesson is associated with higher student engagement rates and achievement gains, according to the results of classroom observational research. If there is little variety in classroom learning tasks, students will find ways to introduce variety themselves--often this will be in the form of off-task behavior. The old adage, "variety is the spice of life," applies to learning as well. In light of the above discussion, one simple way to introduce variety is by alternating group and seatwork activities. In our study we observed a teacher who did not do this.

She typically scheduled entire mornings with mostly seatwork activities and the afternoons were devoted primarily to groupwork. Predictably, we observed a lot of off-task behavior in the mornings. By simply alternating seatwork and groupwork throughout the day, this teacher could have substantially increased student engagement time.

Furthermore, studies have shown that student engagement is higher during a seatwork activity which immediately follows a group activity, than it is during a seatwork activity which follows a previous seatwork activity.

Other ways to increase variety can be achieved after careful consideration of the types of tasks that students are expected to perform--i.e., the content of the tasks and the kinds of responses students are required to make. Think about varying from task to task the sensory modalities used (i.e., seeing, hearing, smelling, touching, tasting) and the kinesthetic requirements.

Supervising seatwork activites more closely. Studies have shown that student attention is higher during seatwork when there is more active supervision. Active supervision means that the teacher circulates among the class, monitoring the progress of student work, occasionally providing encouragement and specific feedback to students, and providing assistance to students when needed.

If you are working with another group at the time, you can position yourself so that you can keep an eye on the students in seatwork. Kounin identified a teacher behavior that he termed, "overlapping", which refers to teacher manifestation of attention to more than one student or activity at the same time. For example, suppose you are working with a small reading group and you notice that Cindy (in seatwork) has just gone off-task. Without interrupting your small group, you look up and quickly praise Cindy's neighbor Mary for paying attention. Then if you note that Cindy has returned to task, she could be praised. At the same time, you have not disrupted the flow of your reading group. Or suppose that Edward (also in seatwork) comes to you for help while you are conducting the reading group. You briefly assist Edward, while at the same time keeping the reading group going. These are examples of teacher "overlapping". Teachers who "overlap" more often have classrooms with higher student task involvement.

Thus, when the whole class is doing seatwork, you can actively supervise by circulating and monitoring. If part of the class is doing seatwork and the remainder are in a group you are leading, you can actively supervise by "overlapping". Obviously, you don't want to overdo active supervision to the extent that it disrupts student attention to task or makes students feel nervous about being observed. On the other hand, if students know they're not being closely supervised during seatwork, they are more likely to be off-task. Let them know that you are aware of what they're doing and that you're trying to help them learn. This will help increase student attention during seatwork.

Summary. There are at least five things you can do to increase student attention:

- Praising students for appropriate behavior,
- Being "withit",
- Doing more group and less seatwork activities,
- Providing a variety of learning tasks,
- Supervising seatwork activities more closely.

PROVIDE MORE DIRECT ACADEMIC INSTRUCTION

We have defined 'direct academic instruction' as interaction with students on the substance or directions of an academic task. Research studies have found that more direct instruction in academic content areas is associated with greater student achievement gains in those academic areas. Teachers who engage in more direct academic instruction tend to lead more group activities, as discussed above, although direct academic instruction can also occur in seatwork settings with individual students. Direct academic instruction includes:

- Feedback,
- Questioning,
- Explaining/modeling,
- Structuring/directing.

Academic feedback. This occurs whenever the student is informed of the correctness or incorrectness of his/her response(s) on the substance of an academic task. Note that, while the teacher is often the source, feedback to a student can also come from the learning materials themselves, a peer, an aide, or an instructional device such as a computer. Research has generally indicated that more academic feedback is associated with greater gains in achievement.

Obviously, feedback is important, for without it, how would students know that they have correctly learned? Also important is the timing of feedback. Studies have shown that the more immediately feedback is given, the more rapidly learning occurs. Immediate feedback is particularly crucial when students are initially learning to do a completely new task.

Feedback is basically either positive or negative. Examples of positive feedback are "That's right.", "Yes.", "Good.", "Correct.", "You got them all right!", etc. Positive feedback is especially important with low-achieving, disadvantaged, and mildly handicapped children, as well as students from low socioeconomic backgrounds (low SES). Examples of negative feedback are "No.", "That's not right.", "Wrong.", "Try again.", "You missed three problems on the assignment.", etc. Negative feedback should be minimized with low-achieving, disadvantaged, mildly handicapped, and low SES students. On the other hand, studies seem to indicate that high-achieving students tend to be more tolerant of negative feedback, and if used judiciously, it can enhance academic achievement.

A common saying is that we learn from our mistakes. Students need to know when they have made errors. Therefore, some negative feedback is necessary. However, it is very important that the student does not feel demeaned or criticized as a person when negative feedback is given. Consider these two contrasting examples of negative feedback:

> "Wrong again. You really oughta try harder. You can't learn if you don't try!"
>
> "Let's do this problem again togther. I'll give you some hints as we work through it. O.K.?"

The first instance connotes blame or criticism of the student, whereas the second example indicates a teacher willingness to help the student learn. Again, research indicates that teacher criticism is negatively related to student achievement.

There used to be a TV commercial for aspirin that showed an irritated and frustrated person with a headache saying, "Please! I'd rather do it myself!" Likewise, students need the opportunity to self-correct their errors or mistakes. In other words, they often want a chance to try to figure out and correct their mistakes themselves. This brings up two points: 1) Telling a student the right or correct answer immediately after an incorrect response may not be as effective in promoting learning as first giving the student an opportunity to self-correct the error. Giving a prompt following an incorrect response may be necessary if the student is having some difficulty. The key point is that we don't want to overly frustrate a student, but at the same time we do want to give her/him an opportunity to self-correct his/her errors. 2) Overdoing negative feedback can result in lowering of student motivation and self-esteem. Thus, if a student is making many different kinds of errors on a learning task, the teacher should ask, "Is this learning task too hard or too advanced for this particular student's skill level?" When there are many student errors on a learning task, the best strategy may be to show the student the correct answer and how to obtain it, and then plan subsequent learning activities which ameliorate those particular problems, should they persist. Then, provide positive feedback on correct student responses.

Academic questioning. Another type of direct instruction is soliciting student verbal responses during a discussion or recitation activity. Studies have indicated that students were more attentive when they were not sure who was going to be called on next to answer. When teachers addressed students in some predetermined manner (e.g., going down the row or around the circle), students tended to be less attentive. Thus, asking questions which are group-focused and then randomly calling on students helps to maintain student attention during a recitation or discussion.

Classroom studies have shown that, when teachers ask more low-level questions which are directly related to academic content, their students tend to make greater gains in academic achievement. Low-level questions are usually convergent—there is a right answer. They often involve recall of factual information or sequence of events, giving definitions, making discriminations or observations, giving or identifying examples of concepts, explaining simple cause and effect, etc.

Another good reason for conducting some group discussion or recitation in academic subjects is that it provides a change of pace from the worksheet and workbook activities frequently done in independent seatwork--i.e., student response modalities are varied from reading and writing to listening and speaking. Also, by listening to students respond you can directly monitor student progress and provide immediate feedback.

Academic explaining/modeling. Another component of direct academic instruction is explaining/modeling, which includes statements dealing with the content (e.g.,lecturing) and demonstrations of skills. In our study we found that, when teachers spent several minutes or more giving a planned explanation or demonstration during an activity (usually at the beginning), students were about five times less likely to perform poorly on the task than when little or no planned explanation was given. Verbal explanations of the substance of a task are especially important for mildly handicapped and disadvantaged students whose reading comprehension is poor.

Some studies have demonstrated that student reading accuracy is increased when the teacher reads the passage aloud before the students are asked to read the passage. Other studies have identified teacher clarity as being postively related to academic achievement. Thus, clear explanations or demonstrations which deal with academic substance are important. Obviously, to use your time efficiently, planned explanations or demonstrations should be given to the whole group, rather than repeatedly to individual students.

Even for certain kinds of independent seatwork activities, some explanation or modeling seems to make a difference. At the beginning of the seatwork activity, you can explain and/or demonstrate to the group how to do the first problem or two. Then, you can ask the students to try the next one or so, giving feedback to the group. Finally, students can do the remainder of the assignment on their own. This strategy is more likely to result in greater student task success than if you give directions only (e.g., "Turn to page 21 of your math book. Answer the first 10 questions. Write your answers on a separate piece of paper.").

In contrast to explanations and demonstrations planned ahead of time, one large study found that explanation based on immediate student need was negatively related to achievement in regular elementary classrooms. That is, giving more explanations in response to immediate student difficulties or misunderstandings of the task is associated with less academic growth. This implies that initial explanations were possibly unclear or absent, or that the task was too difficult for students to begin with. If you frequently find yourself repeatedly giving explanations to individual students who are experiencing difficulties with an assignment, this should tell you that something's not right. Perhaps the directions for the task were unclear, the initial explanation was inadequate, or the task is simply too hard in its present form.

On the other hand, these research results do not imply that you should not help students who experience difficulties with a learning task. But the findings do suggest that, when explanations based on immediate student needs are minimized, long-term student achievement tends to be higher.

Academic structuring/directing. Structuring/directing is similar to academic explaining/modeling. Structuring/directing occurs when the goals or objectives of a task are discussed, or the procedures to be followed in the task are given, whereas academic explanations or demonstrations deal with the content of the lesson itself. Research has shown that more structuring/directing is associated with greater academic achievement.

Teacher structuring/directing of seatwork activities was found in our study to be particularly important for minimizing low task success of mildly handicapped students. Since these students' reading skills are often poor, they are more likely to understand how they are to do an assignment if the teacher tells them the directions, rather than expecting them to read the directions.

Also, telling or reminding students of the purpose of a learning activity helps them gain perspective on why they are to do it, other than being required by the teacher or curriculum. As an example of structuring, a teacher might say, "Learning how to spell words correctly is important so other people will be able to read and understand what you write."

Summary. More direct instruction is associated with greater student achievement gains. Direct instruction includes academic:

- Feedback,
- Questioning,
- Explaining/modeling,
- Structuring/directing.

Direct instruction of groups is also related to high levels of student attention, compared to student attention during independent seatwork.

PROVIDE MORE OPPORTUNITIES FOR STUDENT HIGH TASK SUCCESS

One of the more important findings of a recent study was the positive relationship between student high task success on daily academic classroom activities and academic achievement. Student high task success means that s/he completes a task making very few or no errors (e.g., more than 80% correct responses). The more activities that are completed with high success, the greater the achievement gains. The converse is true as well: the more activities in which students perform very poorly (low task success), the less the achievement gains. This should not be surprising, since task success on classroom activities is simply a daily, task-by-task measure of achievement. So it makes sense that, if a student frequently performs well on classroom academic tasks that are related to content that is covered on an academic achievement test, we would expect him/her to do well on the achievement test.

This finding is also consonant with the concept of 'mastery learning'. The idea of mastery learning is that a student should get an 'A' on the test of attainment of an instructional objective before moving on to the next objective. It is true that some students will master an instructional objective faster than others, but this does not mean that the slower students should be denied the opportunity to master the objective as well.

Of course, we don't expect students to do all learning activities with high task success. When they are in the initial stages of learning a new objective, they will typically make mistakes and perform with medium task success (i.e., make some errors, but not all errors). As appropriate feedback is given, their task performance should subsequently improve on similar tasks until they perform consistently with high task success on that instructional objective. If some students often perform poorly on classroom learning tasks, this should tell the teacher something: the tasks may be too hard for those students. Another way of saying this is that the discrepancy is too great between the skills and knowledge required by the task and the present skills and knowledge of the students. One of the alarming findings in our study of mildly handicapped students was that they were observed to experience low task success in about 10% of the activities. That is, they did extremely poorly on about 1 out of every 10 tasks. On the other hand, normal students in another study were observed to experience low task success about 3% of the time (1 out of 33).

What can you do to increase high student task success and also decrease low task success? Obviously this is a hard question to answer, but research findings suggest several things teachers do:

- Becoming more familiar with students' skills and knowledge,
- Increasing frequency of classroom testing,
- Increasing direct instruction, especially planned explanations, demonstrations, structuring/directing and academic feedback to the group,
- Increasing the number of activities in which previously learned material is reviewed.

This list is only suggestive, clearly incomplete, and there is a good deal of overlap.

Becoming more familiar with your students' specific skills and knowledge. Research has shown that teachers who know their students better have classrooms with greater achievement gains. Teacher awareness of specific student skills and knowledge was measured in one study by having teachers predict ahead of time which items on an achievement test that each student would pass or fail before they were given the test. This finding implies that teachers who know their students better are also in a better position to select or create instructional materials that are well matched to student knowledge and skill levels. Thus, their students are likely to more often experience high success on classroom tasks and in the long run make greater gains in academic achievement.

Another source of information regarding specific student skills and knowledge is daily student worksheets. These worksheets provide up-to-date information concerning the students' understanding of instructional content. By simply reviewing patterns of correct and incorrect answers a teacher can obtain valuable information on specific student's strengths and weaknesses. This information, in turn, can be used to develop lessons that students can successfully complete.

Increasing frequency of testing. Studies have found that teachers who tested their students more often had students who experienced less low task success and more high task success. Testing students need not take up a lot of time and can serve two important functions: 1) It provides feedback to students on their learning progress; and 2) It provides feedback to the teacher on student mastery of instructional objectives. You don't need a lot of items on a test to find out whether a student has mastered an objective. For example, if you construct a test of just 5 items which are representative of the content covered by the objective and which are randomly selected, you can be pretty confident that students who get 4 or 5 of the items completely correct have mastered the objective. Of course, if you want to be more confident or you want to diagnose specific student problems, then you can increase the number of items. However, it doesn't take very many items to make a decision about student mastery, if the chances of student correctly guessing are low, and the items are representative of and randomly sampled from the content.

If intervals between tests are too long, then each test takes on more "importance" to the students and they may become more anxious about testing. On the other hand, if tests are given frequently and regularly, then each test becomes less "important"--i.e., if the students occasionally do not do well on a test it is not such a big deal, since they know they have many more opportunities to demonstrate mastery.

It is also obvious that teachers who test their students regularly and frequently are more likely to be attuned to individual student skills and knowledge. As discussed above, this teacher awareness is related to overall student achievement.

Furthermore, the very process of constructing a test (or selecting one from the curriculum) makes us consider just what it is that we want our students to learn--i.e., what our instructional objectives are. Making up a test for an instructional objective ahead of time helps a teacher to plan and sequence learning activities appropriate for reaching that objective. Worksheet content can be used effectively to develop highly appropriate tests of student progress.

Increasing direct instruction. This topic was covered in an earlier section in some detail, but bears repeating here. In our study we found that more direct instruction was associated with less student low task success. In particular, students were two to three times less likely to perform poorly on a task when teachers gave some verbal directions, planned explanation or demonstration and academic feedback to the group. If the activity was mostly independent seatwork, these three types of direct instruction usually occurred during the beginning of the lesson and lasted several minutes.

Increasing review lessons. In a review lesson students practice using skills and knowledge related to instructional objectives they have already mastered. Since they have mastered the objective and if they have not forgotten, they will usually perform the task with high task success. This is a straightforward way of increasing the amount of high task success in your classroom. It appears that "over learning" of materials is important for long term academic achievement. Obviously, review lessons should not be bunched up, but rather spaced at regular intervals over time. With mildly handicapped students, regular review seems to be particularly important, since they may be more prone to forgetting what they have learned.

One simple way to do a review lesson is to take an old test, and instead of considering it as a test, have the students do it as a review activity. Also, if you discover that some students have indeed forgotten, then you can plan some refresher activities for them. Since it is not practical to regularly review all material previously covered, you will need to decide which instructional objectives are most important and focus on those in your review lessons.

Summary. Students who more frequently experience high task success on daily classroom activities make greater gains in long term academic achievement. Things teachers can do to increase student high task success include:

- Becoming more familiar with students' skills and knowledge,
- Increasing frequency of classroom testing,
- Increasing direct instruction, especially planned explanations, demonstrations, structuring/directing and academic feedback to the group,
- Increasing the number of activities in which previously learned material is reviewed.

SUMMARY

Studies have shown that academic learning time is one of the most important determinants of student academic achievement. Academic learning time (ALT) includes the amount of time: 1) allocated to academic content areas, 2) students are engaged in academic tasks, and 3) students experience high success on those tasks. Based on the results of research studies, teaching strategies for increasing student achievement were recommended:

TO SPEND MORE TIME ON ACADEMIC SUBJECTS:

- Reduce transition time between activities,
- Decrease student misbehavior and time spent disciplining,
- Decrease student wait time during activities,
- Increase the amount of time scheduled for academic content areas.

TO EVOKE MORE STUDENT ATTENTION TO ACADEMIC TASKS:

- Praise students for appropriate behavior,
- Be "withit",
- Do more groupwork and provide more direct academic instruction,
- Provide a variety of academic learning tasks,
- Supervise academic seatwork activities more closely.

TO PROVIDE MORE DIRECT ACADEMIC INSTRUCTION:

- Increase academic feedback (especially positive feedback),
- Increase academic questions (especially low-level, convergent questions),
- Increase academic explanations and demonstrations,
- Increase academic structuring/directions.

TO PROVIDE MORE OPPORTUNITIES FOR STUDENT HIGH TASK SUCCESS:

- Become more familiar with students' skills and knowledge,
- Increase frequency and regularity of classroom testing,
- Increase direct instruction (especially academic explanations, demonstrations, structuring/directions and feedback to the group),
- Increase the number of activities in which previously learned material is reviewed.

SECTION TWO

REVIEW OF THE LITERATURE

SECTION 2

REVIEW OF THE LITERATURE

Recently classroom research has explored the relationship between the amount of instructional time provided to students and their achievement (Fisher, Berliner, Filby, Marliave, Cohen, Deshaw, and Moore, 1978; Harneschfeger and Wiley, 1978; and Lomax and Cooley, 1979). Instructional time is defined as the actual amount of time teachers provide direct instructional activity to pupils. Lomax and Cooley (1979) indicated that there is almost universal agreement among studies documenting the importance of instructional time as a major variable influencing student achievement. These studies suggest the need to examine and perhaps to restructure and to reallocate the instructional time provided in the classroom. Since most special education students usually perform academically below their expected levels it is exceedingly important that we provide instruction that is maximally effective and cost efficient. The field of special education, therefore, appears particularly suitable for research into this area of inquiry. Potentially these investigations could enable special education teachers to accelerate achievement rates by improving their use of instructional time. **We will review some of the** preliminary research findings in this area of inquiry and discuss their implications for special education research and practices.

Relationship of Instructional Time and Achievement

As early as 1963 Carroll formulated a model of instruction that took into account the relationship between instructional time and student achievement. According to this model, degree of learning is determined by the relationship between time needed to learn the content and the amount of time they actually spend learning.

Harris and Serwer (1966) examined the relationship between four methods of teaching reading and the reading achievement of 1141 low socio-economic status (SES) first graders. The central finding indicated that the amount of time teachers taught was a more significant factor in improving student achievement than the type of reading approach they used.

Bond and Dykstra (1967), and Harris, Morrison, Serwer and Gold (1968). reported negative correlations between teacher or student absences and achievement. This suggests that higher frequencies of student attendance is associated with more instructional time and thus correlated with higher achievement rates. Carroll and Spearritt (1967), Hess and Takanishi (1974), and Stallings and Kaskowitz (1974) have assessed the amount of instructional time that students actually engaged in specific content learning activities. Though these results were not entirely consistent, positive associations were found between the amount of time students spent in instruction and their achievement.

Block and Burns (1975) in a review of mastery learning studies also reported a positive relationship between the amount of time students were actively engaged in learning activities and achievement. McDonald (1975) studied reading and mathematics achievement in an elementary school and found student inattentiveness to be negatively related to achievement.

Bennett (1976) who studied the relationship between teaching style and student achievement, concluded that regardless of teaching style students who spent more time studying a subject had higher achievement in that subject.

Fisher et. al. (1977) concluded that the positive relationship found between instructional time and achievement in reading and math provided qualified support for the hypothesis that more time yields more learning. Thus, the pattern of time allocation to various subject matter areas and subareas is an important consideration when planning and implementing instruction. However, the authors indicated that the results do not explain what must be done during the time allocated to a content area in order to increase the amount of learning. The important point of this exploratory study according to the researchers was that differences in the quality of instruction did not appear to overide differences in the amount of instruction.

Policy Studies

In a study with implications for school policy, Wiley (1973) calculated the average amount of schooling by multiplying the length of the school day by the average daily attendance rate. Using these data as an index, a strong positive relationship existed between the amount of schooling and knowledge acquisition in obth reading and mathematics. David (1974), after reviewing 20 studies which examined the relationship between exposure to schooling and achievement, concluded that there were consistent positive relationships between exposure to schooling and achievement scores.

Wiley and Harneschfeger (1974) suggested that achievement is directly determined by only two variables: total time needed by a pupil to learn a task and total time a pupil actively spends on a given learning task. These authors contend that student achievement could be increased without requiring a refined technology of instruction simply by lengthening the school calendar, or the school day, and modifying the distribution of time allocated to various content areas during the school day.

Relationship of Allocated Time and Achievement

Harneschfeger and Wiley (1978) reported that in classes containing many poor readers, teachers actually had allocated less time for reading instruction than in classrooms that contained students with above-average reading scores. Further analysis of the data revealed that classrooms with the greatest number of low achieving pupils also had fewer opportunities to learn and to read. In a related study, Harneschfeger and Wiley (1978) analyzed the difference in actual instructional time provided in a series of classrooms within an urban school district and found that some classes received the equivalent of 69 days more instruction per year than other classes. Students who achieved at higher levels received as much as 27 percent more direct teacher instruction in basic skill areas while students in the lower achieving groups had 27 percent more unsupervised seatwork. The authors concluded that although pupils were using similar materials and receiving essentially equivalent reading programs no one would assume that these pupils have equal opportunities to learn.

Other investigators have analyzed the opportunities to respond provided in the classroom which were defined as the chances provided to the student to actively respond to academic content material. Fox (1974) observed that first grade pupils in an inner city school averaged no more than 20 seconds engaged in directed reading per day. Hall, Delquadri and Harris (1977) reported that a group of fifth grade pupils spent less than eight minutes per day in oral or written responding activities and that they spent approximately 50% of the class time in transition activities. Additional observational data indicated that elementary pupils in low income area schools spent less than 5 seconds a day working on arithmetic facts. Stallings (1975) highlighted the importance of opportunities to learn by reporting consistent significant positive correlations between reading achievement and engagement in reading activities. Rosenshine and Berliner (1978) reported that time spent in reading correlated higher with achievement than any other teacher or student behavior studied.

Hall et. al. (1977) expressed concern regarding the dearth of opportunities to learn in classrooms and suggested four possible explanations which concern special and regular educators who must teach lower functioning children. First, teachers may not be aware that pupils need to spend more time responding in order to learn. Second, the curricular systems employed frequently emphasize activities, materials and breadth of coverage rather than time on task, engagement time and direct instruction. Third, increased numbers of student responses could inundate a teacher with more paperwork unless alternative logistical systems are developed. Finally, the authors maintain that school policy and/or classrooms are not engineered ecologically to maximize responding.

In addition to the research summarized earlier in this paper, Fisher, Berliner, Filby, Marliave, Cohen, Deshaw, and Moore (1978) summarized the findings of the Beginning Teacher Evaluation Study (B.T.E.S.) an extensive study of teaching effectiveness in basic skills at the elementary school level. This study analyzed instruction in reading and mathematics in twenty-five second grade classes and twenty-one fifth grade classes. These investigators reported that:

1. "The amount of time that teachers allocated to instruction in a particular curriculum content area is positively associated with learning in that content area", thus, other things being equal, the more time allocated to a content area, the higher the academic achievement.

2. "The proportion of allocated time that students are engaged is positively associated with learning"-- students who pay more attention learn more.

3. "The proportion of time that reading or mathematics task provide a high success rate for a student is positively associated with student learning."

Based on these findings, Fisher, et. al. (1978) recommended that students spend somewhat more than half their time on tasks they can carry out with high success. Also, for learning basic skills in the elementary grades, the stage of successful practice is particularly important so that students thoroughly master concepts and procedures.

4. "The proportion of time that reading or mathematics tasks provide a low success rate for a student is negatively associated with student learning."

5. "Increases in academic learning time are not associated with decreases in a positive attitude toward mathematics, attitude toward reading or attitude toward school."

Finally, authors reported that older students and/or students who were generally skilled at school learning benefitted from a smaller percentage of time at the high success level.

IMPLICATIONS

The implications of research on instructional time for teaching children with learning problems in the educational mainstream are many. They range from the impact on policy issues for administrators to specific classroom practices for teachers.

Regarding policy issues, the most obvious relate to the work of Wiley and Harneschfeger (1974, 1978, 1978). Their findings suggest that by reallocating the time for various classroom activities, increasing the number of days in the school calendar, as well as lengthening the school day may produce improvement in students' achievement levels. To make such changes, however, would mean that we would have to know how to appropriately reapportion instructional time in the classroom, to renegotiate teacher contracts, and to modify school budgets.

Unfortunately, at this time we have no definitive conclusions that we can rely on to provide information for making such informed decisions. Carnine and Silbert (1979), for example, have questioned how many minutes of reading instruction instructionally naive students require to score at grade level on an achievement test by the end of the third or fourth grade. A related question concerns the limits of students' ability to attend to various tasks throughout the school day. Despite the findings that increasing instructional time may result in achievement gains, we have no data pertaining to the optimal length of a school year, or what effect increasing the time students spend in school would have on children who experience learning problems. We do know that the achievement of handicapped and disadvantaged children regresses during the summer (Stallings, 1975).

Rieth (1974) also found that highly significant gains resulted when "at risk" preschoolers participated in an eleven month program, and without showing evidence of "burn-out" effects. However, we still do not have definitive information on the optimal length of a school day required to accelerate achievement in problem learners.

Additional problems relate to the fact that we do not have any definitive data on the optimal length of a school day required to accelerate achievement. Carnine and Silbert (1979) asked approximately how many minutes of reading instruction is required for an instructionally naive student to score at grade level on an achievement test by the end of third or fifth grade? We don't really know.

A particularly important policy issue concerns the impact of service delivery systems selected for handicapped pupils. Many itinerant and resource programs require student movement to different locales in the school building and thus contribute to increased transition time which is noninstructional time. This raises the question of whether we are actually reducing pupil achievement by utilizing certain delivery systems (Semmel and Rieth, 1978).

Semmel (1979) has defined handicapped learners as "students who have to be taught to enable them to learn." He extends that mildly handicapped pupils do not learn incidently in regular classroom environments, but rather they require direct instruction in order to learn. Thus, it appears that if handicapped learners are going to achieve in mainstreamed environments, teachers will have to allocate specific blocks of instructional time to them.

Carnine and Silbert (1979) indicated that some of the research issues that affect the amount of engaged time are related to the types of schedules, organization of materials, training students receive on independent work habits, and transition from activity to activity. The teacher is also faced with the question of how to shape and maintain high engagement rates. Currently there is a dearth of data regarding optimum engagement times. In a study designed to increase engaged instructional time Rieth, Polsgrove, and Semmel (1979) found that a five-minute increase in reading instructional time produced marked increases in the acquisition and maintenance of sight vocabulary by high school pupils. A problem raised by this study, however, is how can the teacher fit the additional time into his/her schedule. One solution is to examine the amount of instructional time being provided. A second is to develop systems to enable the teacher to maximally utilize his/her time. Another would entail the utilization of tutors and tutoring systems (Semmel, Cohen, and Kandaswamy, 1978).

Research also needs to be conducted regarding strategies to sensitize teachers to the issue of time. Systems will need to be developed to provide teachers with feedback regarding allocation time, instructional time, and engagement time (c.f. Semmel, 1974). The question of logistics will also have to be addressed in the context of a possible increased teacher work load to deal with additional papers produced by the pupils. This concern must be studied and counter strategies must be evaluated.

In summary, a high positive relationship exists between time in instruction (more specifically engagement time in direct instruction) and achievement. The implications for the delivery of services and research activities in special education are considerable.

SECTION 3

SUMMARY OF PROJECT ACTIVITIES

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SUMMARY OF PROJECT ACTIVITIES

Year 1 Activities

During the first year, and exhaustive literature search was completed to insure the inclusion of all relevant information in conceptualizing the observation system necessary to collect the ALT data. Subsequently, and observation system was developed and tested. After intensive observer training, data were collected in two nearby school districts. Twenty-four mildly handicapped students and 22 teachers were observed over a period of several months. A total of 145 full days of observational data were collected, each student being observed an average of 40 hours on eight different days. Students were also pre- and posttested with an Informal Reading Inventory (IRI) and Sterling Math Test (SMT). In addition, teachers kept daily logs of academic activities during the period of observations.

Observation System Development

A variety of extant observation systems and related literature were reviewed in the initial development stages. They included systems by Kounin (1970), Fink and Semmel (1971), Marliave, et al. (1977), Maccia (1973), Johnson (1979), Joyce (1972), and Medley (1973). In addition, relevant parts of observation systems previously developed at the Center for Innovation in Teaching the Handicapped (CITH) (e.g., PRIME, CATTS, and CARTLO projects) were considered. Concurrent with this activity was the exploration of different methodologies such as category, sign, rating, and ethnographic approaches.

Finally the Academic Learning Time Observation System (ALTOS) was adopted from that developed by Marliave, et al. (1977) in the Beginning

Teacher Evaluation Study (BTES). The BTES categories and coding procedures, while similar in nature to many others considered by the CITH staff, were chosen primarily because they would allow direct comparison of results in this study to those in the BTES study of normal children in elementary classrooms. In addition, reliability and validity data on the BTES categories were available from their studies. However, general coding procedures on ALTOS were modified and categories were added to reflect variables of unique importance to special education settings. In addition, ALTOS was designed for tracking a single target student for an entire school day. Since mildly handicapped students often follow individually different schedules, it was considered logistically impractical for a single observer to code more than one target student (TS) at the same time during an entire school day.

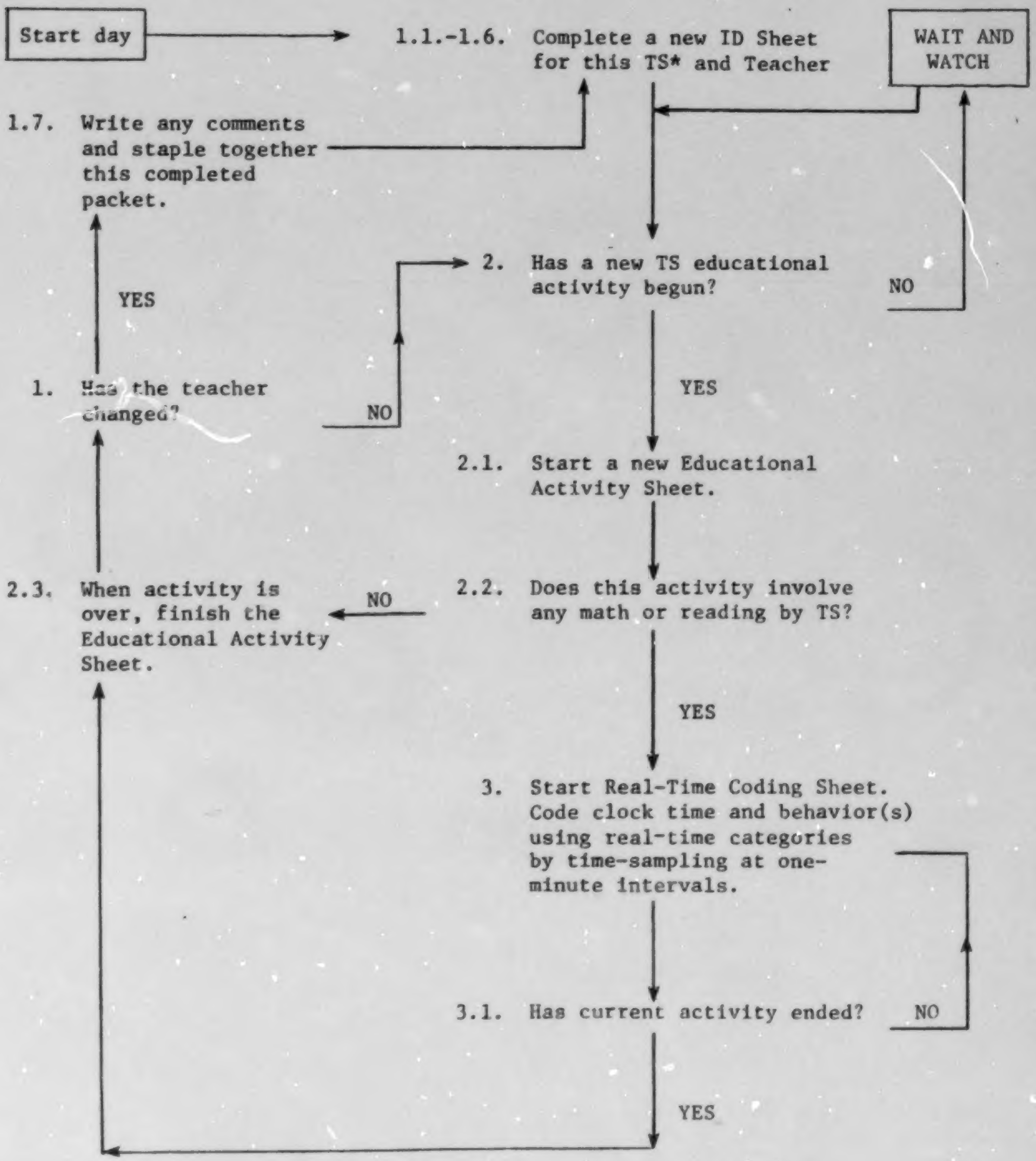
The basic coder decision making procedure in using ALTOS is outlined in Schema 1. As the observer codes, s/he constructs a booklet consisting of three different kinds of coding forms, representing a day of observation of a single target student (TS): 1) Identification sheet, which was completed whenever the TS changed teachers and/or settings; 2) Educational activity sheet, which was completed for each different activity in which TS was supposed to be engaged; and 3) Real-time coding sheet, which was completed for every activity which required the TS to perform reading or math related tasks.

ALTOS identification sheet. This form was completed by the observer every time there was a teacher/classroom change for the TS. On this sheet identification data were recorded which included date, observer name and number, teacher name and number, target student (TS) name and number, class type (regular, resource, self-contained, other) and class size.

Schema 1.

Flowchart for ALTOS

Coder Decision Making


Start day
1.1.-1.6. Complete a new ID Sheet for this TS* and Teacher
WAIT AND WATCH
1.7. Write any comments and staple together this completed packet.
2. Has a new TS educational activity begun?
NO
YES
1. Has the teacher changed?
NO
YES
2.1. Start a new Educational Activity Sheet.
2.3. When activity is over, finish the Educational Activity Sheet.
NO
2.2. Does this activity involve any math or reading by TS?
YES
3. Start Real-Time Coding Sheet. Code clock time and behavior(s) using real-time categories by time-sampling at one-minute intervals.
3.1. Has current activity ended?
NO
YES

---

*Note: TS is the target student to be observed throughout the day.

These data served to identify to whom the following educational activity and real-time coding sheets were relevant.

ALTOS educational activity sheet. This form is completed for each separate educational activity that is allocated for or selected by the TS, excluding transitions. Each activity is defined by a change in the curriculum content and/or setting. Here the observer records the time at which the activity actually begins, the number of students engaged in the same activity as the TS, the TS pacing (self- or other-paced), predominate TS activity(ies) (oral reading, silent reading, reciting, listening, discussing, writing, other), task difficulty for TS (easy, medium, hard),

the TS instructor (teacher, peer, aide, self-instructional materials, teaching machine/tutor, or no instructor), predominate instructor activity(ies) with the TS (lecturing, discussing, prompting, modeling/demonstrating, testing, supervising), the curriculum content (e.g., decoding/phonics, word meaning, reading practice, comprehension, addition/subtraction with regrouping, computational transfer, fractions/decimals, word problems, science, art, physical education, recreation/break, management/procedural, etc.), and time at which the activity actually terminated. Allocated time for various math, reading and other academic activities was calculated post hoc by subtracting time started from time stopped, and transition time (between activities) was also determined by the computer when the observational data were later entered onto the computer. In addition, observers were required to describe in their own words the major tasks performed by the TS and instructor in the activity, as well as characterize the curriculum content and materials used. Furthermore, observers were able to comment on any significant events that occurred during the activity. These open parts of the educational activity sheet permitted later cross-validation of coding categories and the possibility of further qualitative analysis from the observer comments.

ALTOS real-time coding sheet. This was used by the observer, in addition to the educational activity sheet, for each activity which required the TS to perform any reading or math tasks. The purpose of real-time coding was to obtain estimates of TS engagement time and types of instructional behaviors available to TS. To do this, a point time sampling plan at one-minute intervals was incorporated. Once a minute, the observer codes the current TS move, instructor move, and instructor focus. In addition, the observer further describes in his/her own words what occurs at each sampling moment. The BTES categories for student and teacher moves and focus were used for coding at the sampling moments. The TS move was coded as either engaged-written, engaged-oral, engaged-covert, engaged with directions, not engaged-interim, not engaged-waiting, or not engaged-off-task. The instructor move was coded as either academic observational monitoring, academic feedback, academic questioning, explanation based on student need, planned explanation, structuring/directing, task engagement feedback (behavior management), or null (no instructor move available to TS). The focus of the instructor move was coded as either specifically to the TS, to the group or another member of the group which included TS, or null (when the move was also null).

For further explanation of the ALTOS categories and coding procedures, the reader is refferred to the observer training manual in Appendix B.

Teacher Logs

In addition to direct classroom observations by trained coders with the ALTOS, participating teachers were asked to keep daily logs of academic activities of their target student(s). Each day the teacher would record for each academic activity allocated for the TS the academic subject area (e.g., decoding/phonics, grammar, spelling, division, science), a brief description of the task required of the target student, the time at which the activity started and stopped, the TS success rate (high, medium, or low), and a description of the specific materials used. Teachers did not keep logs on non-academic activities such as music, art and physical education.

A teacher instruction manual was prepared which provided directions for and examples of using the log forms. See Appendix C for further details.

Achievement Tests

To measure TS learning gains in reading and math, target students were to be pre- and posttested. A number of tests were reviewed; those selected included the Stanford Diagnostic Reading and Math Tests (SDRT and SDMT), an informal reading inventory (IRI), and the Sterling Math Test. In addition to the standardized tests, the IRI provides measures of oral reading rates (correct and incorrect words per minute) and approximate reading grade level. The Sterling Math Test (SMT) provides comprehensive timed measures of computational skills and fluency in addition, subtraction, multiplication and division. The IRI and SMT were expected to be more sensitive to learning gains than the standardized tests, particularly with the mildly handicapped population being studied. All four tests were to be administered individually by trained testers.

Student Background Information

In addition to classroom observation, teacher logs, and achievement tests, student background information was gathered from school records on the target students. Data on type of student handicapping condition, IQ, birthdate, age when special educational services began, type of special education services provided, standardized achievement test scores, school grades, etc. were recorded from available cumulative folders, after parent permission was obtained.

Sampling Plan

Project staff contacted school systems in the Indianapolis area and the Monroe County Community School System in Bloomington. After meeting with superintendents and special education directors, two systems were willing to participate which had teachers who were interested: Lawrence Township Schools in Indianapolis and Monroe County Schools. Teachers and school principals were then contacted and informed of the nature of the study. Only teachers who were willing to participate voluntarily in the project were considered for selection in the sample. Those teachers who did participate were paid honoraria as a form of compensation for the time spent in keeping the student academic activity logs. Once a teacher did agree to participate, s/he randomly selected a handicapped student and a backup in her/his classroom. Then parent permission forms were sent out for the selected students. A student was not included in the study unless written parent permission was obtained. An additional consideration was the other teacher(s) who taught each selected student. For example, for a student who spent time in a resource room and a regular classroom, it was necessary for both teachers to agree to participate in order to obtain complete full-day observation records and teacher logs. Some initial attrition was unavoidable due to failure to obtain parent permission or cooperation from a student's other teacher(s).

The resulting sample consisted of 24 mildly handicapped students (EMR, LD, ED) and 22 major teachers located in 10 schools in two school systems. In addition, observation data were also collected on 69 other teachers with whom the selected students had minor contact (e.g., art, music, gym, and substitute teachers). Three replications of self-contained classrooms, six replications of resource/regular classroom pairs, and three replications of full-time mainstreamed (consulting teacher) classrooms were represented in the final sample. Obviously, some teachers had multiple target students in their classrooms. Of the 24 students, eight were in self-contained classrooms, 13 in resource/regular classrooms, and three in full-time regular classrooms. Of the 22 major teachers, three were self-contained, six were resource and 13 were regular classroom teachers. These numbers reflect the final sample after attrition of four teachers who were dropped for various reasons (e.g., no parent permission obtained, buddy teacher unwilling to participate, too busy to keep logs, etc.).

Observer Training

Observer training occured in two shifts, one for the five Indianapolis area observers and one for the four Bloomington area observers. All observers had prior elementary school teaching experience, which was considered an important prerequisite for learning the ALTOS, and most had been substitute teaching when hired for the project. Approximately two weeks were required to train each group. The training consisted of viewing and practice coding numerous classroom videotapes available from the CITH tape library, evaluating student work samples for task difficulty, and practice classroom coding. Training continued until all observers obtained acceptable agreement with the trainers on written and videotape criterion tests. In addition, frequent reliability checks were performed during data collection, where observers were paired with each other or with one of the trainers.

Data Collection

In Lawrence Township data collection began with trained testers individually administering the IRI and SMT to the target students. In Monroe County the IRI and SMT were administered as pre- and posttests.

A total of 165 full days of observational data were collected on the 24 target students. Teachers kept their logs during the entire observation interval. Posttesting on the IRI and SMT occurred in mid-May in Lawrence Township and near the end of May in Monroe County.

Observers were paired with each other on a rotating basis once a week for purposes of an additional generalizability (reliability) study of the ALTOS. Completed coding booklets were checked for errors regularly by the project coordinator. Specific observers were notified immediately of any mistakes or ommissions, which were subsequently rectified. In general, coding errors were of a very minor nature and became practically non-existent after the first week into data collection. The majority of errors occurred in rare or unique situations which were not anticipated during observer training. It was possible to detect and correct after the fact these errors due to the extensive note-taking that observers performed as part of coding on the ALTOS.

Data Checking and Computer Entry

Prior to computer entry all observational records and teacher log booklets were carefully checked for missing data and detectable errors by the project coordinator. Wherever possible, data were rectified on the basis of corollary descriptions provided on the forms by teachers and observers. For example, if a content code was ommitted on the ALTOS educational activity sheet, this could usually be easily and confidently reconstructed from the observer notes describing the curriculum content and materials, the target student activity, and the notes accompanying the real-time coding. This structured note-taking provided valuable additional information which facilitated checking the internal consistency of data records. Moreover, at least once a week a student was observed at the same time that the teacher was recording daily academic activity information. Since the observational system included the information recorded on the teacher logs, it was possible to cross-validate the teacher logs with the observational data as well. In this manner, the reliability and validity of the teacher log information could be ascertained. These data will be reported upon completion of data analysis now in process.

In lieu of key-punching, two extensive computer programs were written in BASIC for ALT data entry on the TRS-80 microcomputer available at CITH. Program ALTCODE (see Appendix C) permitted a clerical person to enter ALTOS data onto the microcomputer. ALTCODE provides prompts for all of the ALTOS data, and is structured after the three basic types of recording sheets. In addition to storing data on diskettes, ALTCODE also performed further internal consistency and boundary checking as part of the data entry (e.g., time started greater than time stopped for an activity) and computed allocation time and transition time automatically. ALTCODE also provided an editor to correct any known data entry mistakes. Due to the structure and extensive prompting and checking in ALTCODE, data entry errors were minimized dramatically compared to those which usually occur in key-punching cards. ALTCODE also provided a printout summary of each day of observational data for further scrutiny and checking. Program LOGCODE (see Appendix D) permitted a similar data entry function for the teacher logs.

A third program was written which summarized the real-time coding data for each educational activity (Progam ALTSUM) in order to prepare the ALTCODE raw data for transmission via acoustic coupler to the IU computer time-sharing system (CYBER 172 and CDC-6600) (see Appendix E). Program ALTSUM creates an 80-variable record for each educational activity, which includes frequencies of joint occurrences of the student X instructor X focus codes in the real-time coding data. This type of data aggregation permits the analysis of likelihoods of joint occurrence of data codes (non-metric temporal path analysis -- see Frick (1980)), a procedure distinctly different from the usual correlational procedures employed.

After transmission of data from the TRS-80 to the larger computer, the data were entered into the Scientific Information Retrieval (SIR) system. SIR is a powerful data-based management system which is extremely flexible for manipulation and further aggregation of various data for subsequent analysis by such programs as SPSS and BMD. SIR was used with all observational data, teacher logs, achievement information, background information, etc., during Years 2 and 3 of the project as well, so that combined analyses were possible at the end of the overall study. At the end of Year 1, project staff had transmitted approximately 250,00 data items from the TRS-80 to the CYBER 172 for input into SIR.

Year 2 Activities

Late in the 1980-81 school year, contacts were made with school systems for participation in the Year 2 study. Confirmations were received from Monroe and Brown Counties as well as from Lawrence Township for participation in the second year research and teacher training study. Due to the substantial number of teachers from the Monroe and Brown County Schools who were interested in participating and to the logistical liabilities of including Lawrence Township, the Year 2 data collection and training were conducted exclusively in Monroe and Brown Counties. Once the sites, students and teachers were identified, data collection activities were initiated. Criterion-referenced and norm-referenced achievement measures in reading and math were administered, after student background information and parent permission forms were collected. Concurrently coders were retrained in the use of ALTOS until acceptable observer agreement was demonstrated. Fortunately, we were able to employ coders who worked on the project during Year 1, thus minimizing training time. A total of 21 teachers and 23 students participated in the Year 2 study. During the fall semester, each student was observed for an average of 6 days, approximately 2 hours per day in reading and math activities only. The Year 2 study was designed so that the fall observational data could be pooled with the Year 1 data (using SIR, described above), and standardized achievement tests (SDRT and SDMT) could be given at large enough intervals to be able to discern learning gains, if any. These pooled data served as the basis for design of intervention strategies to increase mildly handicapped student ALT and achievement.

Analysis of the results from the pooled data indicated a number of factors related to ALT (e.g., direct instruction, group structuring/directing, planned explanations to the group, group feedback--see results in the following chapter). However, the sample size was not large enough during Year 1 to obtain significant correlations between ALT variables and residualized gains in academic achievement. Since the relationship between ALT and achievement had been supported in studies of normal children (e.g., BTES results), we proceeded on the assumption that teachers with greater increases in student ALT would also have students with greater achievement gains. Moreover, this assumption could be directly tested after the Year 2 posttest data were collected.

Individual inservice training conferences were scheduled with teachers about a month after semester break, when the observation data had been analyzed. Prior to each conference, each teacher was supplied with a report on the findings to be read beforehand. Individual teacher observational data summaries were prepared from the fall observations. See Appendix D for a sample data summary. Each summary served as a baseline measure of that teacher's behavior and his/her target student's behavior on key ALT variables.

During each inservice conference, a staff member went over the computer printout summarizing teacher and student ALT behaviors, so that each teacher could compare his/her performance and that of her/his students to the general findings. The staff member pointed out specific behaviors that the teacher might increase or decrease in order to increase student ALT, given the relationships documented in the ALTOS observational data analysis. The teacher and staff member discussed ways in which such changes could be made until a satisfactory plan was developed. It was understood that the teacher would attempt to implement these changes, and that observational data collection would continue in the spring semester to verify whether indeed the changes did occur and to see if there was any effect on ALT and achievement.

Individual follow-up conferences were scheduled about 5 weeks later. At this time, a staff member met with each teacher, providing him/her with a new printout summary based on ALTOS data collected since the first conference, so that the fall (baseline) summary could be compared to the spring summary. Positive changes in teacher behavior were confirmed during this follow-up conference, and related changes in student ALT were noted. The most consistent relationship concerned teacher direct instruction and student task engagement. Most teachers who increased direct instruction also increased student engagement. However, some teachers decreased direct instruction, although we had not advised any to do so, and usually this resulted in decreases in student engagement. Furthermore, when student engagement increased, student low task success was very likely to decrease or not occur at all. These experimental findings tended to support the ALT hypothesis.

Near the end of the school year, posttests of academic achievement were administered. A final inservice conference was scheduled during the last two weeks of school, where the teacher was provided both fall and spring individual observational data summaries and achievement test results. A staff member discussed these findings with the teacher, particularly the validity of achievement test results. One finding uncovered during these discussions concerned the timing of the posttests. Some students were tested so close to the end of school that they were not very motivated to do well on the tests, thus resulting in test scores which were lower than their teachers thought they should be.

Observers (who also did the posttesting) tended to corroborate these findings. Although this was not true of all students, nonetheless the timing of the posttesting was apparently too late (on hindsight). Observers also reported, and this was confirmed by data analysis, that towards the end of the school year both teachers and students tended to spend less time on academics. Non-academic field trips, special convocations and recreational activities tended to occur with greater frequency near the end of the school year.

Nonetheless, regression analyses of residualized achievement gain scores and ALT measures did yield results comparable to those in the BTES study of normal children. See the following chapter for details. Although statistical significance was observed less often than in the BTES study, the magnitudes of partial correlation coefficients were similar to and often greater than those in the BTES study. The reason for less significant findings can be attributed primarily to a smaller sample size (i.e., less statistical power) compared to the BTES study.

Data analysis continued during the summer months, ending the Year 2 activities. A number of in-house working papers were prepared which summarized different parts of the overall results. Findings from our data were compared to those in other past studies to check for theoretical and empirical consistency.

Year 3 Activities

Considerable time was spent during the first quarter of Year 3 writing a manual for teachers which summarized the findings in non-technical terms and which suggested concrete strategies for increasing the academic learning time and achievement of mildly handicapped students. Conclusions from other research were also integrated into the manual when relevant to some aspect of ALT or teacher behavior related to ALT (e.g., Kounin's (1970) findings on withitness, overlapping and task involvement; findings on reinforcement and feedback; findings on questioning). The manual was intended not only for dissemination purposes, but also for use in the Year 3 inservice teacher training and replication study. The basic training paradigm was to collect ALTOS baseline observations, present teachers with observation data summaries and the ALT manual, discuss and agree upon anticipated changes in teacher behavior, and collect follow-up ALTOS observations to confirm effects on student ALT.

A draft of the teacher's manual was distributed to a group of local teachers, principals and university faculty members in education for appraisal. Numerous revisions and improvements were suggested by those individuals. The manual was revised significantly and distributed to a similar group for a new appraisal. Further revisions were made on the basis of their feedback. It is noteworthy that later in the year, after having received a complementary copy of this manual, an assistant superintendent of the Monroe County School System requested permission to reproduce 650 copies of the manual for distribution to teachers and administrators. It is also interesting to note that bills have been recently introduced to the Indiana State Legislature to increase the number of school days per year and the length of the school day. Although surely coincidental, it is nonetheless an indication that the wod is being spread on the importance of ALT. A recent newspaper article indicated administrative concern that the amount of time spent bussing special education students not cut into their daily learning time.

The Year 3 study was very similar to Year 2, and was conducted mostly to see if the Year 2 findings would be replicated. School administrators and teachers in Monroe County were contacted in the fall. A total of nine teachers and 16 students participated in the Year 3 replication study. No achievement tests were administered, since the relationship of ALT and achievement had been documented from the Year 1 and 2 combined results. At the beginning of the second semester, baseline observations using ALTOS were begun, so that each student was observed on four to six different days over a six-week period, for approximately one and one half hours per day in reading and math activities only. Individual teacher data summaries from ALTOS observations were prepared and inservice conferences were scheduled about mid-semester. The same training paradigm was followed as for Year 2, except that teachers were provided with the final draft of the manual of teaching strategies which influence ALT and achievement. Follow-up ALTOS observations occurred during the last half of the semester, and similar follow-up conferences with individual teachers were scheduled. Results for these teachers and students followed the same pattern as those from Year 2. One notable difference between this group of teachers and students and those from the previous year was that this group was comprised exclusively of regular teachers (grades 1 through 5) who had mildly handicapped students mainstreamed full-time in their classrooms. It should be noted that this delivery system was not well represented in Years 1 and 2.

During Year 3 a related set of activities occurred in parallel to those described above. The project director was approached just prior to the beginning of Year 3 by the superintendent of the Linton school district, who had heard of our study and who wanted to improve their internal teacher evaluation and inservice training programs. After several meetings, it was decided that all the principals and the superintendent would be trained by project staff to code on a modified version of the ALTOS. An intensive three-day observer training workshop was held several weeks before the beginning of the school year. One of the outcomes of the workshop was a simplified version of ALTOS and ALTOS coding sheets.

The Linton principals then used the modified ALTOS when they observed teachers during the fall as part of their required teacher evaluation activities. They then summarized their data by hand, since there was not enough to warrant use of a computer. These data were then presented to observed teachers as feedback, and suggestions were made on changes in teaching behavior, based on the general ALT findings. Project staff were invited back to Linton about mid-year to present a summary of the ALT and achievement findings to the entire teaching faculty in order to give them a better idea of the basis of the new evaluation system.

Although this activity with the Linton school district was not planned during Year 3, it nonetheless indicates a potentially viable inservice teacher training methodology which attempts to increase ALT and student achievement.

A further unplanned activity during Year 3 involved the Monroe County School Systems, who requested that project staff conduct an inservice teacher training workshop during the spring semester with teachers in the system (note--these were teachers who had not participated in Years 1 and 2 and were not participating in the current study).

Finally, at the time of this writing, a number of articles are in preparation for submission to special education journals for national dissemination.

SECTION 4

RESULTS

The Sample

Table 1 shows some features of the sample target students and their teachers on whom the results of this study are based. The majority of students are male and classified as learning disabled. The majority of teachers are regular due to the fact that most target students who spend time with a special teacher also spend time with a regular teacher. During Year 1 students were observed for 145 days, an average of 6 to 7 full days per target student. During Year 2 students were observed for 123 days (through January) for an average of 6 days per target student, although note that students were observed 1½ to 2 hours per day and only during reading and math activities (during Year 2).

Project staff contacted school systems in the Indianapolis area, the Monroe County Community School System in Bloomington, and the Brown County School System. After meeting with superintendents and special education directors, three systems were willing to participate which had teachers who were interested: Lawrence Township Schools in Indianapolis and Monroe and Brown County Schools.

TABLE 1

ALT Sample Description

		N		%
Mildly Handicapped Target Students*	(1) Year 1	22	(students)	51.2
	(2) Year 2	21		48.8
		43		
Sex	(1) Male	37	(students)	86.0
	(2) Female	6		14.0
Handicap	(1) EMR or MMH**	12	(students)	27.9
	(2) LD	26		60.5
	(3) ED	4		9.3
	(4) Other	1		2.3
Delivery System	(1) Full-time regular	13	(students)	30.2
	(2) Mostly regular	8		18.6
	(3) Half Resource	6		14.0
	(4) Mostly Special	16		37.2
Locations	(1) Lawrence Township	5	(schools)	35.7
	(2) Monroe County	6		42.9
	(3) Brown County	3		21.4
Main Teachers	(1) Regular	37	(teachers)	67.3
	(2) Resource	10		18.2
	(3) Self-Contained	8		14.5
Days of Observation	(1) Year 1	145	(days)	54.1
	(2) Year 2 (thru Jan)	123		45.9
		268		

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*Students' age range 7-13 years, in grades 1-5

**EMR: Educable Mentally Retarded
MMH: Mildly Mentally Handicapped
LD: Learning Disabled
ED: Emotionally Disturbed (Emotionally Handicapped)
Other: Multi-categorical or sensorially handicapped

Delivery Systems

The Delivery Systems in which our target students were enrolled fell into 4 categories:

1. Full-time Regular: The target student (TS--the one specifically observed) spends his/her time in the regular classroom just like any other "normal" student. In some cases this delivery system includes the consulting teacher model, where a special education teacher provides consultation with the regular teacher on educational programming for the target student, although the special teacher does not instruct the target student. In other cases, no special consultation is provided for the regular teacher.

2. Mostly Regular: Target student spends 2/3 or more of his/her time in the regular class and up to 1/3 of the time in a resource room where s/he is taught by a special education teacher (or some other specialist).

3. Half Resource: Target student spends between 1/3 and 2/3 of the time in a resource or self-contained classroom. The remainder of the time is spent in the regular classroom or other mainstream settings.

4. Mostly Special: Target student spends more than 2/3 of the time in a resource and/or self-contained class. TS may be mainstreamed in non-academic activities such as art, music, or physical education.

Note that these fractions of time spent in various settings are based on those activities provided which require TS reading or math related tasks.

The following abbreviations of types of service delivery systems will be used to save space in presentation of results:

Delivery Systems

FR: Full-time Regular

MR-G: Mostly Regular, in the regular classroom

MR-S: Mostly Regular, in the resource classroom
HR-G: Half Regular, in the regular classroom
HR-S: Half Regular, in the resource classroom
MS: Mostly Special
OA: Over all delivery systems

Results: Table 2

During Year 1 only, TS's were observed for full days. The number of activities (NACT) averaged between 16 and 19 per day across the four delivery systems, with no substantial differences among delivery systems. Transition time between activities (TRANTIM) averaged about 3/4 of an hour per day or about 2 1/2 to 3 minutes between each activity, again with no substantial differences among delivery systems. This is somewhat surprising, since we expected that the MR and HR delivery systems would have more transition time due to movement back and forth between regular and resource rooms. Apparently, TS's make the transition between rooms only twice per day (i.e., they attend the resource room once per day), and these are just 2 out of 15 transitions per day on the average. Thus, even if these transition's are slightly longer, their effect is washed out by the larger number of other transitions.

Length of school day (LDAY) varied between 5½ and 6½ hours among the delivery systems, with an OA average of 5 hours 50 minutes. Differences here may be attributed to 2 factors: The school systems included in the study had differing lengths of school days and each system tended to represent only 2 of the 4 delivery systems in Year 1. One school system represented the bulk of the observations of MR and MS delivery systems during Year 1 and its school day was observed to actually begin and end (in terms of educational activities provided) at 8:30 a.m. and 2:00 p.m. in most of its schools. In addition, several of their resource teachers declined to permit observations in their rooms shortly after the study began. Since the TS's typically went to the resource rooms during the last period of the day, observers stopped coding at that point. Thus, these situations produced artifically low LDAY times, which were computed from DASTOP-DASTART (observing). This also explains the large standard deviation for MR.

Percent of transition time (PTRAN) relative to LDAY averaged 12-13% across the delivery systems. PTRAN in this study was slightly less than transition time in the BTES study of normal children in grades 2 and 5 (about 15% of the time).

In summary, it would appear that switching of class type in the split delivery systems (MR and HR), does not add to overall transition time per day; or, in other words, switching classes once per day does not significantly detract from time available to allocate to academics, when comparing the four special education delivery systems.

It should be noted that it was not practical to estimate TRANTIM during Year 2, since observers specifically coded for 1-2 hours per day per TS only when reading/math activities were scheduled and these were often non-contiguous due to observer scheduling complexities and sampling considerations.

TABLE 2

Year 1 Full-Day Observations: ALTOS Header Statistics Per Day by Delivery System

[Means and (Standard Deviations)]*

		FR	MR	HR	MS	OA
	VARIABLE	FULL-TIME REGULAR (N=17)	MOSTLY REGULAR (N=59)	HALF REGULAR HALF SPECIAL (N=14)	MOSTLY SPECIAL (N=48)	OVERALL (N=145)
#	NACT	18.2 (3.3)	15.5 (4.3)	18.8 (3.7)	15.9 (5.2)	15.7 (5.2)
HH:MM	DASTART	8:29 (:12)	8:35 (:36)	8:26 (:09)	8:37 (:14)	8:35 (:26)
	DASTOP	2:53 (:08)	2:11 (:53)	2:51 (:05)	2:23 (:36)	2:24 (:43)
	TRANTIM	0:46 (:17)	0:46 (:20)	0:48 (:17)	0:44 (:26)	0:46 (:22)
	LDAY	6:37 (:16)	5:34 (1:05)	6:25 (:09)	5:47 (:42)	5:50 (:52)
%	PTRAN	12.0 (4.5)	13.4 (5.4)	12.5 (4.3)	12.6 (7.7)	12.9 (6.1)

*Unit of Analysis is a Day of Observation

Results: Table 3

Table 3 summarizes the variables on the ALTOS identification and educational activity sheets for reading/math activities only in each Delivery System (i.e., all other types of activities were excluded for this analysis). Note that educational activity was used as the unit of analysis here; the means represent average scores per activity in reading/math and the percentages reflect the percent of activities observed within each Delivery System class type where those variables were observed. Note also that the MR is split into MR-G and MR-S and likewise HR into HR-G and HR-S, so that location of activities (CLTYPE) was also used as a cutting variable in these two Delivery Systems.

Class size (CLSIZE), or number of students present, of course, differs substantially when comparing Delivery Systems. In regular classrooms an average of 23 to 25 students were present, whereas in the special settings about 5 to 9 students were present. Since smaller classes have been found to be positively associated with greater achievement gains, these differences should be kept in mind when interpreting subsequent results in these settings. All other things being equal, the special education teachers should have more opportunities for individual academic contacts with TS's and provide more individualized instruction, since they have only 1/4 to 1/3 as many students to teach at any given time, compared to regular teachers. As will be discussed below, these relationships tend to be borne out in the data.

Likewise, the number of students in exactly the same activity as TS (NSTUDSAM), also parallels the trend of CLSIZE differences. About 1/2 to 2/3 of the class are doing the same activity as TS. Individualization of instruction can be estimated here by dividing NSTUDSAM by CLSIZE

TABLE 3

Teacher and Target Student Educational Activity Descriptions by Delivery System* (Reading and Math Only)

[Means and (Standard Deviations) OR Percent of Activities]

	FR	MR-G	MR-S	HR-G	HR-S	MS	OA
VARIABLE	FULL-TIME REGULAR (N=307)	MOSTLY REGULAR REGULAR (N=479)	MOSTLY REGULAR RESOURCE (N=77)	HALF RESOURCE REGULAR (N=78)	HALF RESOURCE RESOURCE/ SPECIAL (N=103)	MOSTLY SPECIAL (N=473)	OVERALL (N=1546)
CLSIZE	22.9 (7.0)	25.1 (4.0)	5.4 (6.3)	23.9 (2.9)	7.2 (3.7)	9.3 (4.3)	17.5 (9.3)
NSTUDSAM	12.4 (9.9)	15.3 (10.8)	2.1 (3.9)	18.0 (9.7)	3.1 (4.5)	3.3 (3.3)	9.7 (10.0)
TMALLOC	17.0 (13.0)	16.7 (11.3)	12.2 (6.7)	16.1 (10.1)	13.7 (11.9)	14.6 (10.6)	15.7 (11.4)
TSPACING							
SELF-PACED	57.5	57.3	51.9	54.5	56.4	70.9	61.1
OTHER-PACED	42.5	42.6	48.1	45.5	43.6	29.1	38.9
TSACT 1-1st							
ORAL READING	5.9	4.2	15.6	--	15.5	11.7	8.2
SILENT READING	27.0	19.9	23.4	14.1	22.3	24.8	22.9
RECITING	3.6	5.2	23.4	2.6	8.7	4.2	5.6
LISTENING	18.1	20.7	9.1	29.5	12.6	8.7	15.6
DISCUSSING	1.0	.6	--	--	--	.8	.7
WRITING	35.9	43.5	26.0	48.7	37.9	42.2	40.4
OTHER	8.5	5.9	2.6	5.1	2.9	7.4	6.6
TSACT 2-2nd							
ORAL READING	7.4	4.4	14.3	3.6	10.6	4.1	5.6
SILENT READING	8.2	36.8	14.3	28.6	25.5	14.1	23.1
RECITING	11.5	8.5	16.7	3.6	10.6	11.8	10.4
LISTENING	9.0	16.2	4.8	14.3	6.4	6.4	10.5
DISCUSSING	3.3	3.3	--	3.6	2.1	.9	2.4
WRITING	46.7	28.3	40.5	21.4	40.4	53.6	39.5
OTHER	13.9	2.6	9.5	25.0	4.3	9.1	8.4

TABLE 3 (cont'd)

[Means and (Standard Deviations) OR Percent of Activities]

	FR	MR-G	MR-S	HR-G	HR-S	MS	OA
VARIABLE	FULL-TIME REGULAR (N=307)	MOSTLY REGULAR REGULAR (N=479)	MOSTLY REGULAR RESOURCE (N=77)	HALF RESOURCE REGULAR (N=78)	HALF RESOURCE RESOURCE/ SPECIAL (N=103)	MOSTLY SPECIAL (N=473)	OVERALL (N=1546)
INSTACT 1-1st							
LECTURING	3.0	6.3	--	6.6	4.8	2.3	4.0
DISCUSSING	3.0	4.0	2.6	7.9	3.9	1.5	3.1
PROMPTING	22.0	22.3	50.6	21.0	30.1	27.4	25.9
MODELING	5.6	4.8	2.6	7.9	2.9	3.0	4.3
TESTING	4.6	9.7	14.3	9.2	9.7	7.9	8.1
SUPERVISING	56.6	34.7	23.6	44.7	44.7	51.7	45.5
OTHER	5.3	18.1	1.3	2.6	3.9	6.2	9.1
INSTACT 2-2nd							
LECTURING	8.7	7.2	7.7	10.0	2.6	2.7	5.8
DISCUSSING	13.7	12.0	15.4	13.3	10.3	4.8	10.1
PROMPTING	43.7	29.5	38.5	43.3	59.0	46.9	40.4
MODELING	21.2	12.6	15.4	20.0	12.8	11.6	14.9
TESTING	2.5	1.8	7.7	--	--	1.4	1.7
SUPERVISING	3.7	34.3	15.4	13.3	12.8	26.5	23.0
OTHER	6.2	2.4	--	--	2.6	6.1	4.1
TASKDIFF							
EASY	49.0	34.7	45.4	43.5	44.8	39.3	40.7
MEDIUM	37.7	56.6	46.7	48.4	46.9	49.6	48.9
HARD	13.2	8.7	7.8	8.1	8.3	11.1	10.4

TABLE 3 (cont'd)

[Means and (Standard Deviations) OR Percent of Activities]

	FR	MR-G	MR-S	HR-G	HR-S	MS	OA
VARIABLE	FULL-TIME REGULAR (N=307)	MOSTLY REGULAR REGULAR (N=479)	MOSTLY REGULAR RESOURCE (N=77)	HALF RESOURCE REGULAR (N=78)	HALF RESOURCE RESOURCE/ SPECIAL (N=103)	MOSTLY SPECIAL (N=473)	OVERALL (N=1546)
TSINSTI							
TEACHER	79.3	60.0	75.3	75.6	70.3	61.9	66.4
PEER	2.3	1.5	3.9	2.6	--	.4	1.4
AIDE	2.3	.6	--	--	7.9	7.8	3.7
SELF-INST.MAT.	.7	1.1	1.3	--	2.0	4.0	2.0
TEACHING MCH.	.7	.2	1.3	--	2.0	1.3	.8
NO INSTRUCTOR	14.8	36.6	18.2	21.8	17.8	24.5	25.7
CONTENT							
DECODING/PHON.	3.3	6.0	35.1	1.3	10.7	13.1	9.2
WORD STRUCT.	1.3	2.9	--	1.3	1.9	1.5	1.8
WORD MEANING	3.9	6.3	9.1	2.6	6.8	9.3	6.7
COMPREHENSION	7.2	7.7	6.5	1.3	14.6	9.1	8.1
READING PRACT.	12.7	7.9	14.3	9.0	16.5	8.5	10.2
SPELLING	7.8	7.1	9.1	7.7	7.8	7.4	7.5
GRAMMAR	2.9	8.8	2.6	6.4	--	1.9	4.3
COMPOSITION	1.6	3.1	2.6	3.8	1.0	3.2	2.6
RDG. RELATED	9.8	8.1	1.3	1.3	12.6	6.1	7.4
RDG-BELOW	3.9	2.5	6.5	11.5	9.7	9.1	6.0
TOTAL READING	*54.4*	*60.4*	*87.1*	*46.2*	*81.6*	*69.2*	*63.8*

TABLE 3 (cont'd)

[Means and (Standard Deviations) OR Percent of Activities]

	FR	MR-G	MR-S	HR-G	HR-S	MS	OA
VARIABLE	FULL-TIME REGULAR (N=307)	MOSTLY REGULAR REGULAR (N=479)	MOSTLY REGULAR RESOURCE (N=77)	HALF RESOURCE REGULAR (N=78)	HALF RESOURCE RESOURCE/ SPECIAL (N=103)	MOSTLY SPECIAL (N=473)	OVERALL (N=1546)
CONTENT (cont)							
ADD/SUB NO	4.2	.8	--	--	--	5.9	2.9
ADD/SUB RGP	.6	2.7	--	7.7	--	3.6	2.6
COMP.TRANSFER	1.3	.8	--	9.0	--	.2	1.1
PLACE VALUE	4.2	.4	--	1.3	3.9	.4	1.4
MULTIPLICATION	3.3	6.5	6.5	5.1	6.8	4.4	5.1
DIVISION	6.2	7.5	--	2.6	1.9	1.9	4.6
FRACTION/DEC.	4.9	2.1	--	--	--	.6	1.8
SPATIAL APPL.	3.3	--	--	5.1	--	.4	1.0
WORD PROBS.	.3	2.5	1.3	2.6	1.9	1.3	1.6
MATH-RELATED	8.8	5.0	3.9	7.7	1.0	4.6	5.5
MATH BELOW	.6	.4	--	--	--	3.0	1.2
TOTAL MATH	*37.7*	*28.7*	*11.7*	*41.1*	*15.5*	*26.3*	*28.8*
SCIENCE	2.3	1.7	--	1.3	--	.8	1.3
SOCIAL ST.	4.2	7.7	--	11.5	1.0	.4	4.1
FOR. LANG.	--	--	--	--	--	--	--
TOTAL OTH ACAD	*6.5*	*9.4*	--	*12.8*	*1.0*	*1.2*	*5.4*
ART	--	--	--	--	--	.2	.1
MUSIC	--	.2	--	--	--	--	.1
TECH. ARTS	--	--	--	--	--	--	--
P.E.	--	--	--	--	--	--	--
PERCEPT.DEV.	--	--	1.3	--	1.0	1.3	.5
MGT./PROC.	.3	.2	--	--	--	.2	.2
RECR/BREAK	--	--	--	--	1.0	.2	.3

(and subtracting from 1 so that a higher score represents more individualization of instruction)--e.g., for FR, individualization = 1 - (12.4/27.9) = .46. The following individualization scores obtain:

Ave. CLSIZE	Delivery System	Ave. Degree of Individualization Per Activity
22.9	FR	.46
25.1	MR-G	.39
5.4	MR-S	.61
23.9	HR-G	.25
7.2	HR-S	.57
9.3	MS	.65

As can be seen, about 1.5 to 2 times more individualization occurs in the smaller special class settings relative to the larger regular class settings. (Degree of individualization is more directly measured in Table 4 by the real-time coding category: TSFOCUS). There appears to be an obvious trend between decreasing class size and increasing individualization of instruction.

Average amount of time allocated (TMALLOC) per reading/math activity across all Delivery Systems is about 16 minutes. It appears that the MR-S has somewhat shorter activities (12 minutes) on the average than do the other Delivery Systems, but the standard deviations are fairly large relative to the means.

Target student pacing (TSPACING) was coded as either self- or other-paced for each activity. Over all reading/math activities across all Delivery Systems, about 61% of the activities are self-paced and 39% are other-paced, or about a 3:2 ratio of self- to other-paced. Notable exceptions to this pattern are the MR-S (about 1:1) and MS (about 7:3). It appears that fewer self-paced activities occur in MR-S and more self-pacing occurs in MS Delivery Systems. Another way of interpreting this is that MR-S teachers do more group work with very small groups (see above), and MS teachers do less group work. compared to regular class teachers (FR, MR-G, HR-G).

Looking at the predominant TS activity (1st) (TSACT1) over all Delivery Systems, writing is most predominant in about 40% of the activities, silent reading in 23%, and listening in 16% of the reading/math activities. TS oral reading occurs 2 to 3 times more often in the MR-S, HR-S, and MS Delivery Systems. TS reciting occurs 5 to 8 times more frequently in the MR-S compared to regular class settings. TS listening is not as predominate in the special settings (MR-S, HR-S, and MS) compared to regular classes. The least amount of writing occurs in the MR-S.

For the second most predominant TS activity (TSACT2) over all Delivery Systems, writing occurs as second most predominate in about 40% of the activities, silent reading in about 23%, and reciting and listening each in about 10% of the reading/math activities. Again, a similar pattern obtains when comparing Delivery Systems for the second most predominate TS activity. More activities in the special settings require TS oral reading and reciting, compared to the regular settings.

Looking at page 2 of Table 3, the first most predominate instructor activities (INSTACT1) over all Delivery Systems were supervising (46%) and prompting (26%). Notably more prompting occurred in the special settings, especially MR-S, compared to regular classrooms. In addition, the MR-S teachers tested more often and spent less time supervising.

The second most predominate instructor activities (INSTACT2) over all Delivery Systems were prompting (40%), supervising (23%) and modeling/demonstrating (15%). Prompting was most likely as the 2nd predominate activity in the HR-S and least likely in the MR-G. Again, testing was more frequent in the MR-S.

TS task difficulty (TASKDIFF) over all Delivery Systems was coded as easy (high success) on 41% of the reading/math activities, medium (medium success) on 49%, and hard (low success) on about 10% of the activities. These results are somewhat different than those found in the BTES study of normal children, where about half the activities were easy, half were medium, and less than 1% were hard. Compared to normal children, mildly handicapped children experience high task success less often, and low success more often. It should also be noted that the Delivery Systems represent TS's of varying learning ability. The most capable TS's were likely to be in FR and MR settings, whereas the least capable were likely to be in the MS setting. This may explain why more high success was experienced in the FR Delivery System, although those same students also experienced the most low task success as well. Also noteworthy is that MR-S students experience more high success in their resource rooms, compared to their regular class experiences.

On page 3 of Table 3, it can be seen that the TS instructor (TSINST1) was most often the teacher (66%) or no instructor (26%) in reading/math activities across all Delivery Systems. No instructor means that TS had no direct contact whatsoever with an instructor during the entire activity.

The primary CONTENT (subject matter) in the reading/math activities does differ across the Delivery Systems. The resource teachers (MR-S and HR-S) provided relatively more reading and less math activities than did the regular (FR, MR-G, HR-G) classroom teachers, which indicates obviously that TS's in those delivery systems were most deficient in their reading skills compared to their math skills.

Results: Table 4

In Table 4 instructor and TS behaviors in reading/math activities are presented. These measures are taken from the real-time coding sheet and estimate the average percent time spent in the various categories of behavior in the delivery systems. Single TS, instructor and focus variables are given first, combinations of TS x instructor x focus next, and then some composites are presented at the end of Table 4.

TS behaviors. Over all delivery systems, target students spend the majority of their time engaged-written (EW--26%), engaged-covert (EC--27%), not-engaged off-task (NO--17%) and engaged orally (EO--13%). Note that TS oral engagement is 2 to 3 times higher in the special settings (MR-S, HR-S and MS) compared to the regular classrooms (FR, MR-G and HR-G). As discussed above, more oral reading and reciting occurred in the special settings. Less EW also occurred in the resource settings, and the least amount of off-task behavior (NO) occurred in the MR-S. NO is somewhat higher in the FR and HR-G delivery systems.

Instructor behaviors. The most predominant instructor move was null (NU), meaning that 60% of time no direct instruction was being provided to TS or to a group which included TS*. This is consistent with the fact that about 60% of the educational activities were self-paced (i.e., independent seatwork). Of particular note, the MR-S teachers were engaged in non-direct instruction of TS or his/her group only 43% of the time; or in other words, much more direct instruction was provided to TS's in MR-S rooms.

More academic monitoring (AM) occurs in the special settings (MR-S, HR-S, and MS) compared to the regular classrooms. Likewise more academic

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*Note that if the instructor was providing direct instruction to another group that did not include TS, NU was coded.

TABLE 4

Teacher and Target Student Behavior by Delivery System in Reading and Mathematics Activities Only (1643 activities observed):

[Mean Percent Time (Standard Deviation)]*

VARIABLE	FR FULL-TIME REGULAR (N=13)	MR-G MOSTLY REGULAR REGULAR (N=8)	MR-S MOSTLY REGULAR RESOURCE (N=8)	HR-G HALF RESOURCE REGULAR (N=6)	HR-S HALF RESOURCE RESOURCE/ SPECIAL (N=6)	MS MOSTLY SPECIAL (N=16)	OA OVERALL (N=43)
1. EW	26.2 (9.6)	28.6 (8.1)	21.9 (7.5)	25.9 (11.3)	21.7 (8.2)	28.4 (9.2)	26.3 (8.5)
2. EO	8.7 (5.3)	8.1 (3.3)	24.3 (11.1)	4.4 (1.2)	17.8 (7.3)	16.0 (7.1)	12.6 (6.1)
3. EC	28.8 (10.2)	32.5 (5.2)	26.2 (12.3)	35.6 (13.9)	29.2 (6.8)	21.4 (6.8)	27.2 (9.1)
4. ED	7.2 (1.8)	7.7 (2.6)	5.4 (2.6)	6.1 (1.7)	5.5 (2.8)	6.9 (2.6)	7.0 (2.2)
5. NI	5.0 (1.8)	3.4 (1.9)	5.4 (3.1)	3.2 (1.3)	3.5 (2.3)	5.2 (2.5)	4.5 (2.1)
6. NW	4.5 (3.8)	5.2 (4.3)	7.7 (6.0)	3.9 (2.3)	5.8 (2.9)	6.5 (4.2)	5.7 (3.4)
7. NO	19.6 (10.5)	14.5 (9.3)	9.1 (9.5)	20.9 (10.1)	16.5 (15.1)	15.6 (8.9)	16.7 (9.5)
8. NU	64.7 (10.5)	56.5 (10.7)	43.5 (19.2)	58.0 (17.8)	58.6 (21.3)	59.1 (12.1)	60.0 (11.7)
9. AM	0.5 (0.6)	1.9 (1.7)	4.5 (6.3)	0.0 (0.0)	2.7 (5.1)	2.2 (1.4)	1.6 (1.6)
10. AF	11.8 (4.9)	11.4 (4.1)	27.6 (11.7)	14.8 (5.2)	16.5 (9.3)	13.9 (5.5)	14.0 (5.2)
11. AQ	7.8 (3.9)	11.1 (4.7)	14.5 (12.7)	9.5 (6.6)	10.2 (7.6)	10.2 (6.2)	9.9 (5.1)
12. XN	3.4 (1.8)	3.8 (2.3)	2.6 (2.1)	5.4 (2.5)	3.7 (2.6)	3.1 (2.2)	3.5 (2.1)
13. XP	3.3 (2.9)	6.1 (3.6)	1.8 (1.6)	4.5 (4.3)	1.6 (2.7)	2.1 (3.2)	3.1 (2.9)
14. SD	7.1 (2.0)	7.9 (2.6)	4.9 (1.9)	6.6 (1.4)	5.6 (2.7)	6.7 (2.8)	7.0 (2.3)
15. TF	1.5 (1.2)	1.3 (1.2)	0.6 (0.6)	1.2 (0.7)	1.1 (0.8)	2.7 (1.8)	1.9 (1.5)
16. NUFOCUS	64.8 (10.5)	56.5 (10.8)	43.5 (19.2)	58.0 (17.8)	58.6 (21.3)	59.1 (12.1)	59.0 (11.7)
17. TSFOCUS	11.9 (4.8)	10.0 (4.4)	32.9 (18.5)	6.9 (3.3)	24.8 (11.6)	27.8 (10.0)	19.4 (9.9)
18. GRFOCUS	23.3 (11.1)	33.4 (11.1)	16.7 (16.4)	35.0 (17.6)	16.7 (18.5)	13.1 (10.1)	21.6 (11.9)

TABLE 4 (cont'd)

Mean Percent Time (Standard Deviation)

	FR	MR-G	MR-S	HR-G	HR-S	MS	OA
VARIABLE	FULL-TIME REGULAR (N=13)	MOSTLY REGULAR REGULAR (N=8)	MOSTLY REGULAR RESOURCE (N=8)	HALF RESOURCE RESOURCE (N=6)	HALF RESOURCE RESOURCE/ SPECIAL (N=6)	MOSTLY SPECIAL (N=16)	OVERALL (N=43)
19. ENAMTS	0.3 (0.2)	0.5 (0.6)	2.9 (2.7)	0.00 (0.0)	1.9 (3.3)	1.9 (1.4)	1.2 (1.2)
20. ENAFTS	4.8 (3.2)	4.2 (1.8)	19.9 (11.8)	2.7 (1.2)	10.2 (5.8)	11.2 (4.1)	7.9 (4.2)
21. ENAQTS	2.8 (1.9)	2.4 (1.1)	10.6 (8.9)	1.4 (1.6)	5.1 (2.7)	6.6 (4.3)	4.6 (3.4)
22. ENXNTS	1.4 (1.0)	1.3 (0.9)	1.6 (1.6)	0.9 (0.6)	2.9 (3.0)	2.2 (1.9)	1.8 (1.4)
23. ENXPTS	0.1 (0.2)	0.03 (0.05)	0.6 (1.0)	0.2 (0.5)	0.06 (0.14)	0.23 (0.33)	0.2 (0.3)
24. ENSOTS	1.6 (0.8)	0.6 (0.5)	2.7 (1.8)	0.6 (0.8)	3.6 (3.3)	3.0 (2.2)	2.1 (1.7)
25. ENTFTS	0.2 (0.3)	0.4 (0.4)	0.04 (0.12)	0.4 (0.3)	0.55 (0.52)	1.1 (1.0)	0.6 (0.7)
26. NEAMTS	0.02 (0.09)	0.00 (0.00)	0.09 (0.25)	0.00 (0.00)	0.00 (0.00)	0.02 (0.09)	0.02 (0.07)
27. NEAFTS	0.14 (0.36)	0.10 (0.12)	0.68 (1.22)	0.00 (0.00)	0.14 (0.35)	0.16 (0.39)	0.12 (0.30)
28. NEAQTS	0.00 (0.00)	0.06 (0.11)	0.09 (0.25)	0.00 (0.00)	0.00 (0.00)	0.03 (0.11)	0.02 (0.08)
29. NEXNTS	0.00 (0.00)	0.01 (0.02)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.02)	0.00 (0.01)
30. NEXPTS	0.00 (0.00)	0.00 (0.00)	0.04 (0.12)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)
31. NESDTS	0.00 (0.00)	0.03 (0.07)	0.09 (0.23)	0.07 (0.18)	0.00 (0.00)	0.09 (0.34)	0.04 (0.21)
32. NETFTS	0.53 (0.63)	0.45 (0.68)	0.44 (0.61)	0.67 (0.61)	0.24 (0.29)	1.20 (1.37)	0.81 (1.00)
33. ENAMGR	0.14 (0.35)	1.19 (1.3)	1.46 (3.87)	0.00 (0.00)	0.74 (1.81)	0.21 (0.35)	0.37 (0.69)
34. ENAFGR	6.68 (4.33)	6.71 (2.8)	7.02 (10.33)	11.89 (5.69)	5.78 (6.71)	2.45 (2.89)	5.71 (4.45)
35. ENAQGR	4.58 (2.95)	8.05 (4.1)	3.87 (4.57)	7.57 (5.7)	4.97 (6.15)	3.49 (3.64)	5.04 (3.55)
36. ENXNGR	1.89 (1.80)	2.40 (2.1)	1.01 (1.67)	3.99 (2.07)	0.46 (0.57)	0.90 (1.68)	1.59 (1.69)
37. ENXPGR	3.07 (2.70)	5.78 (3.4)	1.11 (1.72)	4.90 (4.10)	1.50 (2.68)	1.83 (2.99)	2.84 (2.69)
38. ENSDGR	5.29 (2.06)	6.99 (2.7)	2.04 (2.50)	5.81 (1.29)	1.80 (1.47)	3.58 (2.02)	4.72 (2.22)
39. ENTFGR	0.41 (0.45)	0.24 (0.24)	0.00 (0.00)	0.09 (0.22)	0.16 (0.28)	0.15 (0.30)	0.23 (0.31)

TABLE 4 (cont'd)

Mean Percent Time (Standard Deviation)

	FR	MR-G	MR-S	HR-G	HR-S	MS	OA
VARIABLE	FULL-TIME REGULAR (N=13)	MOSTLY REGULAR REGULAR (N=8)	MOSTLY REGULAR RESOURCE (N=8)	HALF RESOURCE RESOURCE (N=6)	HALF RESOURCE RESOURCE/ SPECIAL (N=6)	MOSTLY SPECIAL (N=16)	OVERALL (N=43)
40. NEAMGR	0.03 (0.06)	0.20 (0.26)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.04 (0.11)
41. NEAFGR	0.16 (0.25)	0.44 (0.88)	0.00 (0.00)	0.25 (0.40)	0.36 (0.44)	0.03 (0.13)	0.22 (0.52)
42. NEAOGR	0.43 (0.64)	0.54 (0.52)	0.00 (0.00)	0.50 (0.60)	0.18 (0.21)	0.15 (0.54)	0.29 (0.47)
43. NEXNGR	0.15 (0.31)	0.11 (0.24)	0.00 (0.00)	0.52 (0.66)	0.29 (0.59)	0.01 (0.05)	0.12 (0.26)
44. NEXPGR	0.13 (0.26)	0.27 (0.50)	0.00 (0.00)	0.17 (0.42)	0.00 (0.00)	0.02 (0.07)	0.09 (0.23)
45. NESDGR	0.09 (0.28)	0.27 (0.33)	0.00 (0.00)	0.10 (0.25)	0.22 (0.41)	0.03 (0.09)	0.11 (0.25)
46. NETFGR	0.24 (0.28)	0.24 (0.13)	0.16 (0.43)	0.05 (0.13)	0.19 (0.30)	0.22 (0.38)	0.21 (0.28)
47. ENNUNU	37.6 (12.3)	36.2 (13.4)	22.9 (11.5)	32.3 (12.1)	34.4 (11.5)	33.7 (11.0)	34.2 (10.7)
48. NENUNU	27.0 (10.1)	20.3 (7.3)	20.5 (14.7)	25.7 (9.5)	24.2 (12.3)	25.3 (11.5)	24.8 (9.6)
49. EN	71.0 (10.4)	76.9 (8.5)	77.8 (14.1)	72.0 (9.6)	74.2 (12.5)	72.7 (11.3)	73.1 (9.8)
50. NE	29.0 (10.4)	23.0 (8.5)	22.2 (14.1)	28.0 (9.6)	25.8 (12.5)	27.3 (11.3)	26.9 (9.8)
51. DI	35.3 (10.5)	43.5 (10.7)	56.5 (19.2)	42.0 (17.8)	41.4 (21.3)	40.9 (12.1)	41.0 (11.7)
52. ENDITS	11.2 (5.0)	9.4 (3.9)	38.4 (18.3)	6.2 (2.8)	24.4 (11.8)	26.3 (9.5)	18.3 (9.4)
53. ENDIGR	22.1 (10.0)	31.4 (10.5)	16.5 (16.3)	33.4 (17.3)	15.4 (17.8)	12.6 (9.6)	20.5 (11.1)
54. ENDI	33.2 (9.9)	40.7 (10.6)	54.9 (19.3)	39.6 (17.3)	39.8 (21.1)	38.9 (11.9)	38.8 (11.5)
55. NEDITS	0.79 (0.75)	0.66 (0.82)	1.4 (1.6)	0.7 (0.67)	.39 (0.36)	1.51 (1.59)	1.02 (1.15)
56. NEDIGR	1.22 (1.51)	2.07 (1.89)	0.16 (0.43)	1.6 (0.82)	1.24 (1.28)	0.46 (0.83)	1.10 (1.36)
57. NEDI	2.01 (1.78)	2.73 (2.17)	1.6 (1.6)	2.35 (1.12)	1.62 (1.48)	1.97 (1.49)	2.12 (1.59)

feedback (AF) and questions (AQ) occurred in the special settings, especially the MR-S. Slightly more planned explanations (XP) and structuring/directing (SD) occurred in the regular class settings.

In summary, the predominate instructor behavior (from the point of view of TS) was non-direct instruction (60%), and when direct instruction was provided, it was most likely to be academic feedback (14%), questioning (10%), or structuring/directing (7%).

Instructor focus. The focus of the instructor move was coded along with the move itself. Of course, if the move was null, so was the focus.* On the whole, about 19% of the moves were focused specifically to the TS (TSFOCUS) and 22% to the group or another student in the group which included TS (GRFOCUS). When comparing delivery systems, regular class teachers (FR, MR-G, HR-G) are more group-focused, and special teachers (MR-S, HR-S, and MS) are more TS-focused in their direct instruction. Two and one-half to three times as many direct academic instructor contacts with the TS occurred in the smaller special settings as did in the larger regular settings. This appears to be directly correlated with the class size, as would be expected: the fewer the students, the more time a teacher can spend with each individually, all other things equal. Clearly, much more individual academic instruction occurrs in the resource and self-contained classrooms, and the instruction tends to be more individualized (as discussed above--NSTUDSAM, Table 3).

Regular class teachers did appear to spend more time individually with the TS than would be expected. Given that 23 to 25 or more students are present in the regular elementary class, a teacher who gave equal time to each student would be expected to spend about 4 to 5% of the time individually with each student. Using that figure as a basis for comparison, FR and MR-G teachers are spending about twice as much time with the TS. The HR-G teachers appear to be mostly group-oriented, where TS's are typically mainstreamed in social studies, science and math activities.

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*The reason NULL focus is 59% overall is due to occasional errors in data transmission over phone lines that were not detected and corrected by the computer (less than .001 % of .25 million data items transmitted).

Joint behaviors (TS engagement x move x focus). On pps. 2 and 3 of Table 4, it can be seen generally that TS engagement rates during direct instruction are very high compared to non-engagement during direct instruction. More will be said about this relationship below. In particular, 2 to 4 times as much AF and AQ specifically focused to TS occurred in the special settings (MR-S, HR-S, MS). For group-focused direct instruction, regular class teachers were 2 to 3 times more likely to provide planned explanations and structuring/directing than special teachers.

Looking at variables 47 and 48, TS engagement during non-direct instruction (ENNUNU) over all delivery systems was 34%, compared to non-engagement during non-direct instruction (NENUNU), which occurred 25% of the time. Another way of interpreting this is that TS is only a little more likely to be on-task than off-task during non-direct instruction (i.e., seatwork). Given that non-direct instruction occurred about 60% of the time, this finding seems highly significant from the point of view of educational programming for mildly handicapped students.

Composite behaviors. Over all delivery systems, TS's tend to be engaged (EN) about 73% and non-engaged (NE) 27% of the time. Given that 25% of the NE occurred during seatwork (non-direct instruction), it is clear where the large majority of NE occurred. There appears to be little difference in EN and NE across the delivery systems, with the exception of the MR-S, where EN was somewhat greater (78% vs. 73% on the whole).

Direct Instruction (DI--either to TS or the group) occurred about 41% of the time on the whole. FR teachers engaged in less DI (35%) and MR-S teachers in more DI (57%), compared to the other delivery systems. Perhaps most noteworthy of all, TS engagement during direct instruction (ENDI) occurred 39% of the time, whereas non-engagement during direct instruction (NEDI) occurred about 2% of the time. In other words, TS is about 19 times as likely to be on-task during DI than off-task. Recall that TS was only slightly more likely to be on-task than off-task during non-direct instruction. It is little wonder that more DI has been found in past research to result in higher student achievement, since EN is a necessary (though not sufficient) condition for learning to occur. These findings suggest that one way to increase students' task engagement is to directly teach them more often.

Results: Table 5

In Table 5, instructor and TS behavior in reading/math activities in the three class types (not delivery systems) is summarized. Note that some units of analysis are included in more than one class type (i.e., total N=43, but 63 units are analyzed--e.g. some of the same TS's were used in computing resource room means as well as regular class means). These results generally follow the same pattern as did those in Table 4; thus only marked differences will be discussed.

Variables 17 and 18, TSFOCUS and GRFOCUS, show the differences in focus in the regular, resource, and special classes. TSFOCUS occurred 35% of the time in the special class, 26% in the resource room and 10% in the regular class. GRFOCUS showed the opposite trend: Regular was 29%, resource was 21%, and special was 8.5%. In other words, special class teachers tend to work individually with TS's 4 times as often as with groups, resource teachers about half individualized and half grouped, and regular teachers tend to work with groups about 3 times as often as they do specifically with the TS.

Variable 51, DI (direct instruction), was highest in resource rooms and lowest in regular classrooms. The same ratio between ENDI and NEDI (about 19 to 1) generally obtains across the three class types.

TABLE 5

Teacher and Target Student Behavior by Class Type in Reading and Math Activities Only (1643 activities observed)

[Mean Percent Time (Standard Deviation)]*

VARIABLE	REGULAR CLASS (N=27)	RESOURCE CLASS (N=20)	SPECIAL CLASS (N=16)
1. EW	26.8 (9.3)	22.7 (11.5)	25.7 (10.2)
2. EO	7.6 (4.4)	20.2 (11.0)	19.1 (10.1)
3. EC	31.4 (10.0)	27.4 (10.2)	21.1 (7.0)
4. ED	7.1 (2.1)	5.3 (3.1)	7.3 (2.9)
5. NI	4.1 (1.9)	4.6 (3.3)	5.2 (2.6)
6. NW	4.5 (3.6)	6.6 (5.2)	6.7 (4.4)
7. NO	18.4 (10.0)	13.2 (12.7)	14.9 (9.8)
8. NU	60.8 (12.6)	52.6 (21.2)	56.7 (18.6)
9. AM	0.8 (1.2)	2.4 (4.8)	2.7 (1.9)
10. AF	12.3 (4.7)	20.6 (11.9)	15.4 (7.9)
11. AO	9.2 (4.8)	12.9 (9.5)	10.4 (8.9)
12. XN	4.0 (2.2)	3.1 (2.2)	3.5 (2.7)
13. XP	4.4 (3.5)	2.2 (2.5)	1.5 (3.1)
14. SD	7.2 (2.1)	5.0 (2.8)	7.2 (3.2)
15. TF	1.4 (1.1)	1.2 (1.8)	2.6 (1.9)
16. NUFOCUS	60.8 (12.6)	52.6 (21.2)	56.7 (18.7)
17. TSFOCUS	10.3 (4.7)	26.1 (17.0)	34.8 (18.0)
18. GRFOCUS	28.9 (13.4)	21.3 (18.8)	8.5 (8.3)

*Unit of Analysis = Target Student--Note: There is some overlap of same TS in different class types.

Page 1 of 3

TABLE 5 (cont'd)

[Mean Percent Time (Standard Deviation)]

VARIABLE	REGULAR CLASS (N=27)	RESOURCE CLASS (N=20)	SPECIAL CLASS (N=16)
19. ENAMTS	0.3 (0.4)	1.6 (2.6)	2.4 (1.8)
20. ENAFTS	4.1 (2.6)	12.3 (9.5)	13.5 (6.5)
21. ENAOTS	2.4 (1.7)	7.0 (6.3)	8.3 (9.0)
22. ENXNTS	1.2 (0.9)	1.8 (1.9)	3.2 (2.6)
23. ENXPTS	0.1 (0.3)	0.2 (0.6)	0.2 (0.3)
24. ENSDTS	1.1 (0.9)	2.0 (2.3)	4.3 (3.2)
25. ENTFTS	0.3 (0.3)	0.4 (0.9)	1.2 (1.2)
26. NEAMTS	0.01 (0.06)	0.03 (0.15)	0.14 (0.58)
27. NEAFTS	0.09 (0.26)	0.28 (0.77)	0.16 (0.39)
28. NEAOTS	0.02 (0.06)	0.03 (0.15)	0.03 (0.11)
29. NEXNTS	0.00 (0.01)	0.00 (0.00)	0.00 (0.02)
30. NEXPTS	0.00 (0.00)	0.01 (0.07)	0.00 (0.00)
31. NESDTS	0.03 (0.09)	0.03 (0.14)	0.09 (0.34)
32. NETFTS	0.58 (0.62)	0.39 (0.70)	1.18 (1.40)
33. ENAMGR	0.42 (0.87)	0.80 (2.44)	0.13 (0.29)
34. ENAFGR	7.85 (4.67)	7.89 (9.47)	1.65 (2.83)
35. ENAOGR	6.27 (4.21)	5.70 (6.31)	2.03 (2.88)
36. ENXNGR	2.51 (2.06)	1.21 (1.97)	0.34 (0.54)
37. ENXPGR	4.10 (3.34)	1.94 (2.58)	1.31 (2.94)
38. ENSDGR	5.91 (2.20)	2.95 (2.43)	2.76 (1.91)
39. ENTFGR	0.29 (0.37)	0.06 (0.17)	0.15 (0.36)

Page 2 of 3

TABLE 5 (cont'd)

[Mean Percent Time (Standard Deviation)]

VARIABLE	REGULAR CLASS (N=27)	RESOURCE CLASS (N=20)	SPECIAL CLASS (N=16)
40. NEAMGR	0.07 (0.16)	0.00 (0.00)	0.00 (0.00)
41. ENAFGR	0.27 (0.53)	0.13 (0.30)	0.00 (0.00)
42. NEAOGR	0.48 (0.57)	0.16 (0.49)	0.01 (0.04)
43. NEXNGR	0.22 (0.42)	0.09 (0.33)	0.01 (0.05)
44. NEXPGR	0.18 (0.37)	0.01 (0.06)	0.00 (0.00)
45. NESDGR	0.14 (0.29)	0.08 (0.24)	0.02 (0.06)
46. NETFGR	0.20 (0.22)	0.27 (0.61)	0.09 (0.17)
47. ENNUNU	36.0 (12.3)	29.6 (15.4)	31.6 (14.2)
48. NENUNU	24.7 (9.4)	22.9 (15.5)	25.1 (11.8)
49. EN	73.0 (9.7)	75.5 (15.0)	73.2 (12.0)
50. NE	27.0 (9.7)	24.5 (15.0)	26.8 (12.0)
51. DI	39.2 (12.6)	47.4 (21.2)	43.3 (25.7)
52. ENDITS	9.5 (4.6)	25.3 (5.9)	33.1 (17.9)
53. ENDIGR	27.4 (12.7)	20.5 (18.6)	8.4 (8.3)
54. ENDI	36.9 (12.1)	45.9 (21.0)	41.5 (18.8)
55. NEDITS	0.74 (0.73)	0.78 (1.18)	1.61 (1.79)
56. NEDIGR	1.56 (1.51)	0.75 (1.13)	0.13 (0.21)
57. NEDI	2.30 (1.76)	1.54 (1.46)	1.73 (1.77)

Page 3 of 3

Results: Table 6

In Table 6, instructor and TS behaviors are grouped by task success in reading/math. Note that the analysis was performed two ways: 1) Using the educational activity as the unit of analysis and 2) Using the TS as the unit of analysis.

TS behavior. TS's are engaged covert (EC) more in high success than in low success activities. Much more off-task (NO) occurs during low success activities than in high success activities. Whether TS's perform poorly because they are off-task, or they are off-task because they perform poorly, cannot be determined from these descriptive results. The results do tend to confirm the hypothesis that TS engagement is necessary but not sufficient for high task success. Clearly, other factors affect task success in addition to engagement, such as appropriateness of curriculum to student ability level.

Instructor behavior. There appears to be more non-direct instruction (NU) in low success than in medium or high success activities. Less academic feedback (AF) and less planned explanation (XP) are provided during low success tasks. Also, when teachers give less direction (SD), task success is more likely to be low.

Focus of move. In low success activities group focus is less than in medium and high success activities. What these results mean will become clearer when combinations of behaviors are examined.

Joint behaviors (TS move x instructor move x focus). No clear trends are evident in variables 19 through 32, except that more NETFTS occurred in low task success activities (i.e., instructor disciplining of TS off-task behavior). The trends appear to be clearer in the group focus variables (33 through 46). When more instructor AF, XP, and SD directed to the group was provided, TS's were 2 to 3 times more likely to perform very well than

TABLE 6

Target Student and Teacher ALTOS Behaviors by Task Success: Reading and Math Only: Mean Percent Time (Standard Deviation)

VARIABLE	HIGH SUCCESS ACTIVITIES (N=601)	MEDIUM SUCCESS ACTIVITIES (N=720)	LOW SUCCESS ACTIVITIES (N=147)	HIGH SUCCESS (N=42)	MEDIUM SUCCESS (N=43)	LOW SUCCESS (N=39)
1. EW	30.2 (31.1)*	29.4 (27.7)	26.2 (22.9)	26.1 (14.3)**	26.0 (10.8)	26.3 (17.1)
2. EO	13.8 (22.0)	15.8 (22.7)	12.3 (18.5)	12.9 (8.4)	14.7 (11.3)	12.5 (15.6)
3. EC	29.9 (27.6)	28.0 (24.6)	22.3 (19.7)	30.4 (13.6)	26.6 (11.1)	23.1 (15.6)
4. ED	7.8 (10.9)	6.5 (9.5)	5.7 (9.2)	7.3 (3.4)	7.6 (4.2)	5.8 (5.1)
5. NI	4.0 (8.3)	3.8 (7.5)	4.3 (6.1)	4.5 (3.4)	4.7 (2.3)	4.8 (4.6)
6. NW	4.8 (9.8)	4.1 (8.9)	5.4 (10.0)	6.0 (4.9)	6.1 (5.0)	5.3 (7.3)
7. NO	9.5 (14.9)	12.5 (17.2)	24.0 (26.0)	12.8 (7.9)	14.3 (10.8)	22.2 (15.3)
8. NU	54.9 (38.1)	57.3 (36.8)	63.7 (33.6)	57.0 (17.9)	56.1 (15.1)	61.6 (26.5)
9. AM	1.3 (6.5)	2.9 (9.7)	2.4 (6.8)	1.0 (1.7)	2.0 (2.4)	1.9 (2.9)
10. AF	16.9 (23.2)	15.1 (22.3)	11.8 (18.5)	14.6 (7.8)	15.7 (8.4)	12.5 (17.3)
11. AQ	10.9 (19.5)	10.8 (19.0)	9.8 (18.1)	10.7 (8.2)	10.2 (7.2)	10.6 (12.3)
12. XN	2.7 (6.3)	2.3 (5.6)	3.8 (8.8)	4.1 (3.9)	3.5 (3.4)	4.7 (5.6)
13. XP	4.2 (12.9)	3.1 (10.3)	0.7 (2.9)	3.4 (4.0)	3.4 (4.8)	0.8 (2.6)
14. SD	7.7 (10.7)	6.4 (9.6)	5.3 (8.1)	7.3 (3.5)	7.6 (4.1)	5.5 (5.0)
15. TF	1.6 (4.6)	2.0 (5.4)	2.5 (4.9)	1.8 (1.8)	1.6 (2.1)	2.5 (3.5)
16. NUFOCUS	54.9 (38.1)	57.3 (36.8)	63.6 (33.7)	57.1 (17.9)	56.2 (15.1)	61.6 (26.5)
17. TSFOCUS	20.0 (27.8)	22.6 (28.3)	21.5 (25.6)	19.9 (11.7)	21.5 (12.9)	24.6 (23.0)
18. GRFOCUS	25.1 (33.9)	20.1 (30.6)	15.0 (25.2)	23.7 (15.8)	22.3 (14.2)	13.7 (18.4)

* Activity is Unit of Analysis
** Target Student is Unit of Analysis

Page 1 of 3

TABLE 6 (cont'd)

Mean Percent Time (Standard Deviation)

VARIABLE	HIGH SUCCESS ACTIVITIES (N=601)	MEDIUM SUCCESS ACTIVITIES (N=720)	LOW SUCCESS ACTIVITIES (N=42)	HIGH SUCCESS (N=42)	MEDIUM SUCCESS (N=43)	LOW SUCCESS (N=39)
19. ENAMTS	0.8 (5.5)	1.9 (8.0)	1.9 (6.00)	0.7 (1.5)	1.4 (1.8)	1.5 (2.2)
20. ENAFTS	9.5 (18.2)	9.5 (16.8)	7.6 (15.1)	8.1 (4.7)	9.2 (6.5)	9.1 (16.9)
21. ENAQTS	5.0 (13.7)	5.3 (13.1)	5.2 (10.6)	5.3 (5.9)	5.0 (5.6)	5.7 (7.1)
22. ENXNTS	1.2 (4.2)	1.4 (4.2)	2.2 (5.5)	1.7 (2.7)	2.3 (3.3)	3.2 (4.3)
23. ENXPTS	0.1 (1.1)	0.3 (2.6)	0.2 (1.1)	0.1 (0.4)	0.2 (0.5)	0.2 (0.6)
24. ENSDTS	2.0 (5.2)	2.1 (5.9)	1.9 (4.8)	1.9 (2.1)	2.0 (2.3)	2.5 (4.2)
25. ENTFTS	0.7 (2.7)	0.8 (3.9)	0.5 (1.9)	0.9 (1.1)	0.6 (1.5)	0.6 (1.2)
26. NEAMTS	0.02 (0.58)	0.01 (0.22)	0.00 (0.00)	0.01 (0.09)	0.00 (0.01)	0.00 (0.00)
27. NEAFTS	0.20 (1.85)	0.29 (1.63)	0.29 (1.71)	0.11 (0.40)	0.15 (0.43)	0.45 (2.02)
28. NEAQTS	0.04 (0.82)	0.03 (0.46)	0.02 (0.21)	0.03 (0.14)	0.03 (0.14)	0.01 (0.07)
29. NEXNTS	0.00 (0.00)	0.01 (0.17)	0.00 (0.00)	0.00 (0.00)	0.00 (0.02)	0.00 (0.00)
30. NEXPTS	0.00 (0.00)	0.01 (0.21)	0.00 (0.00)	0.00 (0.00)	0.00 (0.02)	0.00 (0.00)
31. NESDTS	0.04 (0.64)	0.06 (0.94)	0.00 (0.00)	0.03 (0.11)	0.06 (0.39)	0.00 (0.00)
32. NETFTS	0.41 (2.3)	0.80 (3.12)	1.49 (3.72)	0.46 (0.74)	0.57 (0.92)	1.45 (2.94)
33. ENAMGR	0.42 (3.3)	0.95 (5.1)	0.42 (2.3)	0.22 (0.61)	0.54 (1.10)	0.32 (1.16)
34. ENAFGR	7.00 (15.41)	5.13 (13.5)	3.40 (8.5)	6.25 (6.34)	6.00 (5.96)	2.54 (4.60)
35. ENAQGR	5.73 (13.8)	5.19 (13.6)	4.39 (13.4)	5.23 (5.01)	4.89 (4.72)	4.50 (8.75)
36. ENXNGR	1.37 (4.3)	0.95 (3.8)	1.32 (6.1)	2.13 (3.04)	1.24 (1.82)	1.36 (4.42)
37. ENXPGR	3.96 (12.8)	2.69 (9.9)	0.46 (2.4)	3.21 (3.73)	3.18 (4.69)	0.63 (2.18)
38. ENSDGR	5.25 (10.0)	4.07 (8.0)	3.28 (6.4)	5.31 (3.47)	5.36 (4.22)	2.85 (3.89)
39. ENTFGR	0.27 (1.7)	0.16 (1.2)	0.28 (1.9)	0.34 (0.83)	0.12 (0.26)	0.20 (0.87)

TABLE 6 (cont'd)

Mean Percent Time (Standard Deviation)

VARIABLE	HIGH SUCCESS ACTIVITIES (N=601)	MEDIUM SUCCESS ACTIVITIES (N=720)	LOW SUCCESS ACTIVITIES (N=42)	HIGH SUCCESS (N=42)	MEDIUM SUCCESS (N=43)	LOW SUCCESS (N=39)
40. NEAMGR	0.07 (0.86)	0.08 (0.96)	0.09 (0.68)	0.05 (0.19)	0.04 (0.14)	0.04 (0.26)
41. NEAFGR	0.12 (1.31)	0.20 (1.96)	0.24 (1.53)	0.17 (0.61)	0.26 (0.77)	0.33 (1.41)
42. NEAQGR	0.14 (1.13)	0.26 (2.10)	0.40 (2.03)	0.20 (0.49)	0.25 (0.59)	0.39 (1.02)
43. NEXNGR	0.13 (1.32)	0.01 (0.27)	0.27 (1.89)	0.18 (0.44)	0.01 (0.07)	0.15 (0.62)
44. NEXPGR	0.07 (0.88)	0.09 (1.48)	0.02 (0.24)	0.07 (0.23)	0.07 (0.30)	0.01 (0.10)
45. NESDGR	0.08 (0.84)	0.15 (1.13)	0.20 (1.32)	0.13 (0.44)	0.13 (0.51)	0.21 (0.78)
46. NETFGR	0.18 (1.28)	0.17 (1.47)	0.18 (1.45)	0.18 (0.37)	0.25 (1.09)	0.21 (0.76)
47. ENNUNU	38.0 (35.5)	39.1 (33.6)	33.1 (29.0)	35.4 (14.5)	32.9 (13.3)	32.5 (21.2)
48. NENUNU	16.8 (18.4)	18.2 (18.7)	30.4 (25.0)	21.7 (8.9)	23.2 (9.8)	29.1 (15.3)
49. EN	81.7 (19.0)	76.6 (19.2)	66.4 (25.2)	76.7 (9.1)	74.9 (9.9)	67.7 (15.5)
50. NE	18.3 (19.0)	20.4 (19.2)	33.6 (25.2)	23.3 (9.1)	25.1 (9.9)	32.3 (15.5)
51. DI	45.1 (38.1)	42.7 (36.8)	36.3 (33.6)	43.0 (17.9)	43.9 (15.1)	38.4 (26.5)
52. ENDITS	19.3 (27.5)	21.3 (27.9)	19.6 (24.4)	18.6 (11.4)	20.7 (12.8)	22.7 (22.6)
53. ENDIGR	24.3 (33.0)	19.2 (29.4)	13.5 (23.1)	22.7 (14.9)	21.3 (13.8)	12.4 (16.9)
54. ENDI	43.5 (37.6)	40.5 (36.3)	33.1 (32.2)	41.3 (17.4)	42.0 (15.4)	35.1 (24.9)
55. NEDITS	0.72 (3.25	1.21 (3.72)	1.80 (4.00)	0.64 (1.03)	0.82 (1.22)	1.90 (3.50)
56. NEDIGR	0.81 (3.89)	0.97 (4.62)	1.41 (4.93)	0.97 (1.57)	1.02 (1.89)	1.35 (2.91)
57. NEDI	1.53 (5.17)	2.18 (5.79)	3.22 (6.24)	1.62 (1.93)	1.84 (2.18)	3.25 (4.20)

very poorly. It would appear that when group-directed AF, XP, and SD is absent or slight within an activity, TS's are more likely to do very poorly on the reading/math task. One interpretation of these results is that when teachers give some explanation (e.g., modeling, demonstrating), directions, and feedback to the group, then TS's are more likely to do very well on the activity than they are to do very poorly. This makes sense, since the majority of TS's have reading difficulties, so they would be less likely to understand written directions and explanations--i.e., they are likely to perform poorly if they do not understand what they are to do and/or how to do it. In addition, they have the opportunity to self-correct their errors and confirm their correct work by listening to academic feedback given to other students. One might also speculate that TS's perform better when they have the opportunity to view peer modeling of correct task performance, which is more apt to occur during group-focused instructor moves. This is consonant with higher EC during high success tasks.

Combined behaviors. When non-engagement (NE) is higher, TS is more likely to perform poorly on the task. When TS is engaged during direct instruction to the group (ENDICR), s/he is about twice as likely to perform very well than very poorly (23% vs. 12%). Also, the reverse trend obtains for NEDI: TS is about twice as likely to perform very poorly than very well then not-engaged during direct instruction (3.2% vs. 1.6%).

Results: Table 7

In Table 7 estimates of average probabilities of TS and instructor relationships are summarized. These probabilities were obtained from the mean percent times given in Table 4. For example, the mean percent time TS was engaged during direct instruction (overall) was 38.8 and the mean percent DI was 41.0. Therefore the estimated probability of EN given that DI was occurring is 38.8/41.0=.95. More formally, $\hat{P}(EN|DI)=.95$, or the chances are that 95 times out of 100 TS will be engaged during direct instruction, whereas about 5 times out of 100 s/he will be non-engaged ($\hat{P}(\sim EN|DI)=.05$).

What is noteworthy is that this relationship between EN and ~EN during direct instruction is fairly constant across all delivery systems.

TS engagement during non-direct instruction is much less ($\hat{P}(EN|\sim DI)=.58$), and for non-engagement, $\hat{P}(\sim EN|\sim DI)=.42$. While TS is 1½ times more likely to be engaged than non-engaged during non-direct instruction, this is much less than the fact that s/he is about 19 times as likely to be engaged as not during direct instruction. Another way of interpreting this is that TS is about 12 times more likely to be off-task during non-direct instruction than during direct instruction. Note that when non-engagement is higher, students are more likely to perform poorly on reading/math tasks (see Table 6).

In summary, type of delivery system is irrelevant to the relationship between student engagement and instruction. When DI occurs, students are extremely likely to be on-task; when DI is absent students are only slightly more likely to be on-task than off-task.

TABLE 7

Probabilities of Relations Among Student Engagement (EN), Non-Engagement (~EN), Direct Instruction (DI) and Non-Direct Instruction (~DI):

[Average Probability of Relationship]

RELATION	FULL-TIME REGULAR	MOSTLY REGULAR REGULAR	MOSTLY REGULAR RESOURCE	HALF RESOURCE REGULAR	HALF RESOURCE RESOURCE/ SPECIAL	MOSTLY SPECIAL	OVERALL
$\hat{P}(EN \mid DI)$	.94	.94	.97	.94	.96	.95	.95
$\hat{P}(\sim EN \mid DI)$	.06	.06	.03	.06	.04	.05	.05
$\hat{P}(EN \mid \sim DI)$	.58	.64	.53	.61	.59	.60	.58
$\hat{P}(\sim EN \mid \sim DI)$	.42	.36	.47	.39	.41	.40	.42
$\hat{P}(EN)$	.71	.77	.78	.72	.74	.73	.73
$\hat{P}(\sim EN)$	.29	.23	.22	.28	.26	.27	.27
$\hat{P}(DI)$	.35	.44	.56	.42	.41	.41	.41
$\hat{P}(\sim DI)$	.65	.56	.44	.58	.59	.59	.59

Results: Table 8

In Table 8, the relations among task success, instructor behavior and student engagement are explored. These are given over all delivery systems. First, it was found that *total* DI by itself does not substantially alter the probabilities of task success ($\hat{P}(Hi)=.41$, $\hat{P}(Med)=.49$, $\hat{P}(Lo)=.10$)--see lower right section of Table 8. However, when investigating those specific DI variables that did seem to make a difference (see Table 7), some relevance to task success was found. While academic feedback to TS (AFTS) by itself was irrelevant to task success, AFGR, SDGR and XPGR did appear relevant. Given the base rate of low task success ($\hat{P}(Lo)=.10$), it is reduced when group feedback ($\hat{P}(Lo|AFGR)=.04$), explanations, ($\hat{P}(Lo|XPGR)=.02$), or directions ($\hat{P}(Lo|SDGR=.06$) are present. This is simply another way of stating what was concluded from Table 7--i.e., the chances of low task success are decreased when more group feedback, explanations and directions are provided. When they are provided, chances of high task success are only slightly higher than the base rate. These results suggest that these specific kinds of DI are positively relevant to task success, but in themselves are not sufficient. That is, other factors, such as the match between student skill level and curriculum content and student motivation and feelings, may also be important. Unfortunately, these other factors were not measured in the present study.

TABLE 8

Probabilities of Relations Among Student Task Success (Hi, Med, Lo), Instructor Behavior, and Student Engagement

RELATION	OVER ALL DELIVERY SYSTEMS	RELATION	OVER ALL DELIVERY SYSTEMS
$P(Hi \mid AFTS)$	.38	$P(Hi \mid EN)$	.42
$P(Med \mid AFTS)$	.51	$P(Med \mid EN)$	.49
$P(Lo \mid AFTS)$	.11	$P(Lo \mid EN)$	.09
$P(Hi \mid AFGR)$	.44	$P(Hi \mid {\sim}EN)$	.38
$P(Med \mid AFGR)$	.51	$P(Med \mid {\sim}EN)$	.49
$P(Lo \mid AFGR)$	.04	$P(Lo \mid {\sim}EN)$	.13
$P(Hi \mid SDGR)$	.42	$P(Hi \mid DI)$	.41
$P(Med \mid SDGR)$	.52	$P(Med \mid DI)$	.50
$P(Lo \mid SDGR)$	.06	$P(Lo \mid DI)$	.09
$P(Hi \mid XPGR)$	.45	$P(Hi \mid {\sim}DI)$	.41
$P(Med \mid XPGR)$	.53	$P(Med \mid {\sim}DI)$	.48
$P(Lo \mid XPGR)$	.02	$P(Lo \mid {\sim}DI)$	.11
$P(Hi)$	.41		
$P(Med)$	.49		
$P(Lo)$	.10		

Results: Table 9

In Table 9 probability estimates are presented for task success given combinations of learner moves (EN and ~EN) and instructor moves, where the instructor moves are specifically broken down into SDIGR (=AFGR+XPGR+SDGR) and non-direct instruction (~DI). Here it can be seen the chances of low student task success are less during ENSDIGR(.05) than in the other modes (.10 to .14). That is, mildly handicapped students in this study are 2 to 3 times less likely to perform very poorly on a reading/math task when engaged during specific direct group instruction which includes academic feedback, planned explanations and structuring/directing.

TABLE 9

Probabilities of Relations Among Student Task Success (Hi, Med, Lo) Given Student Engagement (EN, -EN) and Specific Instruction (SDIGR = AFGR + XPGR + SDGR, -DI)

	HIGH SUCCESS	MEDIUM SUCCESS	LOW SUCCESS
EN•SDIGR	.44	.52	.05
EN•~DI	.43	.47	.10
~EN•SDIGR	.35	.51	.14
~EN•~DI	.38	.49	.13

How Time Is Spent by Mildly Handicapped Elementary Students

Table 10 shows the amount of time, expressed in minutes per day on the average and in percent time, that mildly handicapped students spend in various activities during the school day. These data were aggregated from the Year 1 observations only, since those were full-day observations (Year 2 and 3 observations were one to two hours per day in math and reading activities only). For purposes of comparison, BTES data on normal students using the same observation categories were taken from the Fisher, et al. (1978) report. Note that composite averages and percentages were computed across both grades 2 and 5 for the BTES results, weighted by respective sample sizes in those grades, so that comparisons could be made with our sample of mildly handicapped students (grades 1 through 5).

From Table 10 it can be seen that there are many similarities in the profiles of mildly handicapped and normal children in elementary schools. One notable differeence was the length of the school day in our sample (368 minutes per day) compared to that in the California schools (333 minutes per day). Thus, when making comparisons, percent time should be used. Normal students spend about 6 percent more time in reading and language arts than do mildly mentally handicapped (MMH) students. Math time is almost identical. MMH students spend 3 percent more time in transition, but percent time in other activities is almost identical to normal students. It would appear that although the MMH students were in school longer than their normal counterparts, the extra time can be attributed mostly to more time spent in non-academics, break, transition and management procedural.

MMH student engagement time in minutes per day, as well as percentagewise, is almost identical to normal students. However, MMH

Table 10. HOW TIME IS SPENT IN ELEMENTARY SCHOOLS: COMPARISON OF CITH & BTES RESULTS

ACTIVITY TYPE	HANDICAPPED (CITH)*[1] (Grades 1-5)		NORMAL (BTES)*[2] (Grades 2 + 5)	
	Min/Day	Pct.Time	Min/Day	Pct.Time
Reading and Language Arts	90	24	99	30
Math	41	11	40	12
Other Academic	24	6	13	4
Non-Academic	64	17	57	17
Break	89	24	77	23
Wait	(*7)	(*)	4	1
Transition	47	13	34	10
Management/Procedural	13	3	8	2
Length of School Day	368		333	
ACTIVITIES WHICH INCLUDE READING/MATH AS PRIMARY OR SECONDARY CONTENT AREA	138	38	138	41
- Student Engagement	102	75	101	73
- Student Non-Engagement	36	25	37	27
- Direct Instruction	57	42	42	30
- Non-Direct Instruction	82	58	96	70
TASK SUCCESS READING:				
-High	25	36	48	48
-Medium	43	53	48	48
-Low	11	10	4	4
-Unknown	10	-	-	-
TASK SUCCESS MATH:				
-High	9	33	17	42
-Medium	20	48	22	56
-Low	7	19	1	2
-Unknown	5	-	-	-
TASK SUCCESS ALL ACTIVITES:				
-High	76	46	68*	45*
-Medium	75	44	79*	52*
-Low	20	10	5*	3*
-Unknown	-	-	-	-

*Reading & Math Only

*[1] Results from full day observations of mildly handicapped students from Year 1 of this study, using ALTOS: average minutes per day & percent time (grades 1-5 combined)

*[2] Results from full day observations of normal students BTES study (Fisher, et. al., 1978): average minutes per day & percent time (grades 2 + 5 combined)

* Wait only observed in Reading/Math Activities

students spend about 12 percent more time receiving direct instruction (42 percent vs. 30 percent).

The largest differences occur when looking at task success (Table 10). MMH students experience high task success in reading 12 percent less than do normal students. MMH students also experience low task success 6 percent more of the time than do normals. A similar pattern obtains for task success in math activities. Notably, MMH students experience low task success in math 17 percent more often. Given the relationship between high task success and academic achievement (see following section), it is therefore not surprising that MMH students achieve at lower levels and at slower rates than do their normal counterparts.

In Table 11, student and instructor behaviors in reading and math activities only in the two studies are compared. It can be seen that little differences exist in overall student engagement and non-engagement rates, although we know from the previous table that the MMH students are less likely to be successful during math and reading activities. Some differences are apparent in the teacher behavior comparisons. MMH teachers spend proportionally somewhat more time questioning, providing needed explanations, planned explanations, and structuring/directing than do teachers of normal students, resulting in 12 percent more direct instruction for MMH students. Knowing the very strong relationship between direct instruction and student engagement (p = .95 -- see previous section), one can hypothesize that, had the MMH students not received more direct instruction, their engagement rates would have been lower by about 10 percent. Moreover, the increased direct instruction can be often attributed to time spent in the resource

Table 11. STUDENT AND INSTRUCTOR BEHAVIORS

	HANDICAPPED (CITH) READING/MATH		NORMAL (BTES) READING/MATH	
	Min/Day	Pct Time	Min/Day	Pct Time
STUDENT BEHAVIORS:				
Engaged - Written	38	28	NOT AVAILABLE	
- Oral	16	11		
- Covert	41	29		
- Directions	9	6		
TOTAL ENGAGEMENT	103	75	101	73
Not-Engaged Interim	5	3	NOT AVAILABLE	
- Wait	7	5		
- Off-Task	24	17		
TOTAL NON-ENGAGEMENT	36	25	37	27
INSTRUCTOR BEHAVIORS:				
Academic - Monitoring	3	2	*	*
- Feedback	18	13	19	13
- Questioning	15	11	9*	7*
- Needed Explanation	4	3	2	1
- Explanation - Planned	5	4	3	2
- Structuring/Directing	9	7	7	5
- Task Engagement Feedback	2	2	3	2
TOTAL DIRECT INSTRUCTION	57	42	42	30
NON-DIRECT INSTRUCTION	82	58	96	70

* = Combined (AM + AQ)

room or self-contained classroom, where class sizes are normally much smaller, allowing teachers to give more attention to individual students and small groups.

In Table 12, time spent in various educational activities is reported for the MMH students in our study only (the BTES study did not code activities the same way we did, so no comparisions are possible). These results essentially recapitulate those presented earlier, except that data from Year 1 only were used, so that time in minutes per day could be legitimately estimated. Note also that percent time adds to 100 percent for each classification (e.g., for pacing, for task success in reading, etc.), so that one can compare the relative amount of time spent in categories in each classification.

In Table 13, MMH student and teacher behavior results are given. These repeat information from Table 11, with the addition of standard deviations, to give the reader a feeling for the variances.

Relationships between ALT and Achievement

Analysis of relationships among ALT measures themselves have been presented above. What is the relationship between ALT and academic achievement gains? To answer this question and for comparative purposes regression analyses were performed following the pattern of those in the Fisher, et al. (1978) study. The reader should note the implications of the linear assumptions inherent in the regression model, since these assumptions may be necessarily restrictive. Furthermore, beta weights in regression analysis are notoriously unstable in small samples, leading research methodologists to recommend fairly large sample sizes (e.g., greater than 100). In our study, the total n for the regression analyses

Table 12. YEAR 1 ALTOS RESULTS (n = 24): EDUCATIONAL ACTIVITY DESCRIPTIVE STATISTICS

	MIN/DAY		PERCENT TIME	
TARGET STUDENT (n = 24)	MEAN	S.D.	MEAN	S.D.
PACING				
- Self-paced	127.3	35.3	52.2	13.1
- Other-paced	115.4	30.2	47.8	13.1
PREDOMINANT STUDENT TASK				
- Oral Reading	11.1	9.9	4.7	4.5
- Silent Reading	39.0	23.4	16.7	10.0
- Reciting	5.2	5.3	2.3	2.3
- Listening	53.8	20.4	23.3	8.7
- Discussing	1.6	2.9	0.7	1.3
- Writing	52.7	18.0	22.6	6.4
- Other	68.2	26.6	29.6	12.1
TASK SUCCESS IN READING				
- High	25.2	16.4	30.7	16.6
-Medium	43.0	13.7	55.8	15.5
-Low	11.4	14.6	13.5	13.2
TASK SUCCESS IN MATH				
- High	9.5	9.2	25.9	22.2
- Medium	20.0	15.3	52.7	26.4
- Low	6.7	6.9	21.4	23.5
TASK SUCCESS IN ALL ACTIVITIES				
-High	75.5	38.0	42.9	15.9
-Medium	75.2	27.2	44.6	14.1
-Low	20.4	17.8	12.4	10.1
TARGET STUDENT INSTRUCTOR				
INSTRUCTOR (OF TARGET STUDENT)				
- Teacher	137.6	30.6	60.1	11.5
- Peer	3.2	6.5	1.4	3.0
- Adult Aide	9.3	10.1	4.2	4.5
- Self-instructional Material	4.1	5.0	1.8	2.4
- Teaching Machine	8.1	6.1	3.6	2.7
- No Instructor	66.8	31.7	28.9	12.0
PREDOMINANT INSTRUCTOR TASK				
- Lecturing	16.2	12.4	7.2	5.7
- Discussing	10.9	8.7	4.6	3.6
- Prompting	39.4	19.3	17.4	9.5
- Modeling/Demo	18.5	12.0	8.0	5.5
- Testing	16.2	13.0	6.7	5.3
- Supervising	106.4	25.8	46.3	11.1
- Other	23.6	23.2	9.7	8.9

Table 12 (Continued)

PRIMARY CONTENT AREA	MIN/DAY		PERCENT TIME	
	MEAN	S.D.	MEAN	S.D.
READING/LANGUAGE ARTS				
- Decoding/Phonics	7.3	6.8	2.1	2.1
- Word Structure	3.8	9.0	1.0	2.3
- Word Meaning	8.7	10.7	2.5	3.0
- Comprehension	10.0	7.3	2.8	2.0
- Reading Practice	15.4	11.6	4.1	2.9
- Spelling	10.0	9.0	2.8	2.0
- Grammar	6.0	7.9	1.6	2.2
- Composition	3.7	4.8	1.0	1.3
- Reading Related	15.8	13.7	4.2	3.5
- Reading Below Test Level	8.8	11.5	2.4	3.1
MATHEMATICS				
- Add./Subtract., No Re-grp.	2.8	6.2	0.8	1.9
- Add./Subtract., No Re-grp.	2.0	3.7	0.6	1.2
- Computational Transfer	2.5	8.7	0.6	2.2
- Place Value/Numeration	0.7	1.9	0.2	0.5
- Multiplication	5.4	6.5	1.5	1.9
- Division	7.4	11.3	2.0	3.0
- Fractions/Decimals	3.0	7.3	0.8	1.9
- Spatial Application	1.8	4.9	0.5	1.3
- Word Problems	1.5	3.0	0.4	0.8
- Math Related	12.1	9.9	3.3	2.5
- Math Below Test Level	2.3	5.9	0.6	1.6
OTHER ACADEMIC				
- Science	3.5	4.2	0.9	1.2
- Social Studies	19.8	23.2	5.2	5.9
- Foreign Language	.4	1.9	0.1	0.5
NON-ACADEMIC				
- Art	12.9	7.6	3.5	2.1
- Music	11.7	7.1	3.2	1.8
- Technological Arts	0.2	1.0	0.1	0.3
- Physical Education	11.3	8.5	3.1	2.2
- Perceptual Development	2.5	6.8	0.7	1.8
- Management/Procedural	12.8	9.0	3.5	2.5
- Recreation/Break	89.1	31.2	24.0	7.8
- Personal Experiences/Feelings	2.5	3.4	0.7	0.9
- Other	18.9	12.7	5.1	3.4
TOTAL READING	89.6	26.5	24.5	7.2
TOTAL MATH	41.3	15.8	11.3	4.1
TOTAL OTHER ACADEMIC	23.7	24.3	6.3	6.2
TOTAL NON-ACADEMIC*	161.8	48.7	45.3	11.6
(Missing/Unknown Content)	4.5	7.9	1.4	2.5
TOTAL TRANSITION TIME	46.7	8.2	12.7	-
TOTAL TIME PER DAY	367.6	30.0		

* NOTE: Total Non-Academic includes Recreation/Break and Management/Procedural

Table 13. YEAR 1 ALTOS RESULTS: TARGET STUDENT AND INSTRUCTOR BEHAVIOR DESCRIPTIVE STATISTICS

	MIN/DAY		PERCENT TIME	
	MEAN	S.D.	MEAN	S.D.
TARGET STUDENT				
Engaged - Written	37.7	12.2	27.8	7.2
- Oral	15.7	7.6	11.5	5.4
- Covert	40.5	16.0	28.9	7.9
- Directions	8.6	2.7	6.4	2.1
TOTAL ENGAGEMENT	102.5	25.8	74.6	8.6
Non-Engaged - Interim	4.6	2.0	3.4	1.3
- Waiting	6.8	4.3	5.0	3.0
- Off-Task	24.4	17.5	17.0	9.3
TOTAL NON-ENGAGEMENT	35.7	17.9	25.4	8.6
INSTRUCTOR				
Non-Direct Instruction	81.6	27.0	58.5	10.2
Academic Monitoring	3.1	2.3	2.4	1.7
Academic Feedback	18.3	8.4	13.0	5.1
Academic Questioning	14.9	7.5	10.9	4.8
Academic Explanation-Needed	4.2	2.6	3.0	1.5
Academic Explanation-Planned	5.0	4.0	3.7	3.1
Academic Structuring/Dir.	8.7	2.8	6.6	2.2
Academic Task Engagement FB	2.4	2.0	1.9	1.8
TOTAL DIRECT ACADEMIC INSTRUCTION	56.6	18.6	41.5	10.2
FOCUS				
Target Student	24.3	11.1	18.8	9.2
Group w/ Target Student	32.3	19.4	22.7	11.9

was 44. For purposes of cross-validation, the sample was divided into two halves (Groups A and B, n = 22 in each) by random selection, so that stability of regression coefficients could be studied. As a caveat in advance, the reader should note that the following analyses are subject to the classical problem of instability of beta weights. Therefore, conclusions from these analyses should be viewed as tentative rather than definitive.

Achievement measures. Four achievement tests were administered at pretesting and posttesting occasions: the Sterling Math Test (of arithmetic computational skills), the Silvaroli Reading Inventory, the Stanford Diagnositic Math Numeration Subtest, and the Stanford Diagnostic Reading Comprehension Subtest. Tests were given during a one-week interval in two to three sittings by trained testers. Levels of the Stanfords were selected according to student ability levels as indicated by their teachers. If a level was too high or too low at pretest time, the next level down or up was readministered at a different sitting, in order to control for floor and ceiling effects. Scores on the Stanfords were converted to scaled scores, using the norms provided by the test developers, in order to achieve comparability of scores across the four different levels.

The Sterling Math Test consists of thirteen subtests. These were combined resulting in four subtests as follows: addition/subtraction with no regrouping, addition/subtraction with regrouping, multiplication and division. Thus, the four subtests directly paralleled respective content coding categories on the ALTOS, so that time students were observed in activities coded by these categories could be directly compared to the Sterling results in regression analyses. For each subtest, two different scores were constructed: fluency and accuracy. Fluency refers to the number of problems solved correctly during a one-minute timing (i.e., it is a rate measure). Accuracy refers to the percent of problems attempted which were solved correctly, since there were many more problems on a given subtest than any student could complete during a one-minute timing. Thus, accuracy scores reflect the extent to which the student correctly performs the arithmetic operation, whereas fluency reflects how rapidly correct performance occurs. When more than one of the original subtests were combined into a single subtest corresponding to the ALTOS content code, a composite average score was constructed.

The Silvaroli Reading Inventory consists of three purportedly parallel versions (A, B and C). Dale-Chall, Spache and Harrison-Jacobs readability formulas were used to estimate the difficulty level of the reading passage at each designated grade level for each version. Some discrepancies in grade levels of passages were discovered, according to readability indices, in each version. Thus, a single version was constructed, using passages from the three original versions, which had readability levels spaced approximately the same distance apart across the 10 ordered grade levels (pre-primer through grade 8). The inventory was administered to students following the guidelines set forth in the administrator's manual, until a scores were obtained for independent, instructional and frustrational levels, respectively. For each of these three levels, the following measures were constructed: fluency, accuracy, and errors. Fluency refers to the number of words read correctly per minute. Accuracy refers to percentage of words read correctly. Errors refers to the number of words read incorrectly (miscues) per minute. Since the same three levels may not have been administered during the posttest, due to increases in student oral reading proficiency, and since not all students were tested on the same three levels, it was necessary to devise a method of scaling so that comparability of student reading proficiency both within and among students was possible. Three composite scores were constructed for fluency, accuracy and error measures, respectively. Each composite was formed by taking the harmonic mean of the three levels for a given student on a given testing occasion, where the weighting factors were the grade level equivalents derived from the readability indices for the passages involved. Thus, easier passages (i.e., lower grade levels) were given less weight relative to harder passages (i.e., higher grade levels). If this or a similar scaling method were not employed, then it would be difficult to compare, for example, a student who read a 6th grade passage at 70 words per minute to a student who read a 1st grade passage at 100 words per minute, since the difficulty levels of those passages are quite different. This problem is analogous to comparison of scores from different levels of the Stanford Diagnostic Tests, and the resulting need for scaled scores.

In Table 14 means and standard deviations are reported for pre- and posttests for the 12 measures of math and reading achievement (for groups A and B and the total (A+B)). Correlations between pre- and posttest scores are also given. It should be noted that these correlations tend to be very high--often .90 or higher. This fact is significant for regression analysis, when the pretest is used as a covariate entered first into the equation, so as to result in very little residual variance (unaccounted for by the pretest) to explain by

Table 14. ACHIEVEMENT SCORES (PRE- AND POSTTEST)--YEAR 1 and 2 COMBINED RESULTS

		PRETEST		POSTTEST		PRE/POST
ACHIEVEMENT MEASURE	GROUP*	MEAN	S.D.	MEAN	S.D.	CORRELATION
1. Addition/Subtraction (No Regrouping) FLUENCY	A	111.5	75.1	113.3	74.9	.96
	B	104.2	75.0	129.6	89.7	.95
	TOTAL	107.8	74.3	121.4	82.1	.94
2. Addition/Subtraction (No Regrouping) ACCURACY	A	82.6	29.5	84.0	28.1	.95
	B	79.4	26.9	84.7	22.2	.86
	TOTAL	81.0	28.0	84.3	25.1	.91
3. Addition/Subtraction (w/ Regrouping) FLUENCY	A	15.3	13.7	16.6	14.6	.91
	B	15.0	14.3	16.2	14.9	.96
	TOTAL	15.1	13.9	16.4	14.6	.94
4. Addition/Subtraction (w/ Regrouping) ACCURACY	A	59.1	43.1	64.4	39.2	.84
	B	61.2	40.1	64.9	39.4	.92
	TOTAL	60.1	41.2	64.6	38.8	.88
5. Multiplication FLUENCY	A	41.6	50.2	47.5	52.1	.96
	B	35.3	47.3	50.0	54.0	.86
	TOTAL	38.5	48.3	48.8	52.5	.91
6. Multiplication ACCURACY	A	40.8	35.8	47.8	41.1	.90
	B	34.5	34.5	45.4	40.6	.78
	TOTAL	37.6	34.9	46.6	40.4	.84
7. Division FLUENCY	A	4.7	6.6	7.9	9.3	.86
	B	7.1	11.9	8.5	11.5	.82
	TOTAL	5.9	9.6	8.2	10.3	.82
8. Division ACCURACY	A	32.4	39.8	41.3	46.0	.92
	B	32.5	41.4	46.5	48.7	.71
	TOTAL	32.5	40.2	43.9	46.9	.81
9. SDMT MATH NUMERATION	A	-	-	-	-	-
	B	-	-	-	-	-
	TOTAL	244.4	77.3	261.8	60.7	.93
10. SDRT READING COMPREHENSION	A	-	-	-	-	-
	B	-	-	-	-	-
	TOTAL	352.4	100.7	361.0	101.0	.97
11. IRI Reading FLUENCY (n=33)	A	-	-	-	-	-
	B	-	-	-	-	-
	TOTAL	49.9	33.6	55.5	37.4	.91
12. IRI Reading ERRORS (n=33)	A	-	-	-	-	-
	B	-	-	-	-	-
	TOTAL	8.4	8.6	6.5	3.6	.30
13. IRI Reading ACCURACY (n=39)	A	-	-	-	-	-
	B	-	-	-	-	-
	TOTAL	77.2	21.9	82.0	18.4	.87

*N for total group = 44. Groups A & B formed by randomly dividing total in half (N=22 each) for cross-validation.

any ALT variables. When pre/post correlations are high, little residual variance is left to be accounted for. This problem is well known in the literature, and is in part due to the nature of correlational analysis and in part to the nature of the measures employed. Standardized test scores are especially problematic when estimating achievement gains due to the typically very high correlation between pre- and posttests. Nonetheless, there is some variance left to try to account for, albeit small, in the following regression analyses.

In Table 14 it can be seen that the posttest means are higher than the pretest means for each achievement measure and group, the one exception being for reading errors, which would be expected to decrease, as they did. In general, however, achievement gains tend to be rather small. Furthmore, standard deviations are roughly of the same magnitude as their respective means, indicating a great deal of variability in the distributions of scores. This should not be surprising, since the sample includes MMH students ranging in age from 6 to 13 years in grades 1 through 5.

ALT measures. Twelve measures of ALT were constructed for each set of regression analyses: proportions of student engagement during high, medium and low task success activities; total student engagement; direct instruction during high, medium and low task success activities; total direct instruction; high, medium and low task success activities; and total time allocated.

For each set of analyses (e.g., see Tables 15 - 27), only observational data relative to the type of achievement measure were used. For example, for multiplication fluency, only those activities coded on ALTOS as multiplication as the primary subject matter were used in the analysis. Each of these activities was coded as either a high, medium or low task success activity, depending on how well the stuent performed during the activity. Student engagement during high task success activities in multiplication (for example) is indicated by the proportion of time that the student was observed on-task during multiplication activities in which s/he made very few or no errors. Similar proportions were formed for student engagement during medium and low task success activities. Total student engagement is indicated by the proportion of time the student was on-task during activities in which multiplication was the primary subject matter, regardless of task success. Similar proportions were formed for direct instruction. Although direct instruction is not an ALT measure per se, it was found to be highly related to student engagement in an earlier analysis, and thus was included here to see whether it was also related to gains in student achievement. High task success was indicated by the amount of time accumulated for multiplication activities in which the student made very few or no errors, divided by the total time allocated to multiplication--i.e., it is the proportion of time high task success was experienced during multiplication activities. Proportions were similarly formed for medium and low task success. Finally, the total task success time (bottom right cell) indicates the total time allocated to the content area (e.g., multiplication), divided by the total time observed--i.e., it estimates the relative proportion of total school time allocated to that content area. It was necessary to convert all ALT measures to proportionate times, since not all students were observed for the same total amount of time. Although it would have been ideal to know the actual amount of time spent on a particular content area between pre- and posttests, this was logistically impossible. One could estimate such an amount of time, given the days of observation sampled, by multiplying the proportion of time in a content area by the number of days between pre- and posttesting. However, since the pre/post interval was essentially the same for all students (plus or minus two weeks), the amount of estimated time would be almost perfectly correlated with the proportion of time that that activity content area was observed. Therefore, nothing would be gained by the latter pro-rating procedure.

Partial correlation coefficients. Partial correlation coefficients are reported in Tables 15 through 27. Each of these is the correlation of a particular ALT variable with the posttest variable after the effects of the pretest variable have been partialled out (of both the posttest and that ALT variable). In effect, the pretest variable is statisically controlled for. Moreover, the square of the partial correlation coefficient indicates the proportional amount of remaining variance that would be additionally accounted for if that variable were entered next into the regression equation, after having first entered the pretest variable. A correlation of .30 or higher is statistically significant with an n of 44 ($p < .05$) for the total group; a correlation of .43 or higher is significant with an n of 22 ($p < .05$) for groups A and B.

ALT and addition/subtraction with no regrouping--FLUENCY. None of the partial correlations were significant between any of the ALT variables and fluency in addition/subtraction computations involving no regrouping, although total time allocated ($r = .24$) and total student engagement time ($r = .23$) were positive. See Table 15. The reader should note the instability of the partial correlation coefficients in groups A

Table 15. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Addition/Subtraction (No Regrouping)--Fluency

Time in Activities in Which Task Succes Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	.35	.29	-.07	.37
	B	-.01	.33	.06	.17
	TOTAL	.14	.25	-.01	.23
Direct Instruction	A	.29	.36	-.07	.21
	B	.20	.21	.29	.28
	TOTAL	.24	.20	.02	.22
Task Success	A	.37	.29	-.07	.26
	B	-.07	.38	.05	.22
	TOTAL	.12	.26	-.02	.24

☐ = $p < .05$

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* Partial correlation coefficents--i.e., correlation of variable with posttest, other after accounting for variance due to pretest.

** N for total group = 44. Groups A & B formed by randomly dividing total in half (N=22 each) for cross-validation.

Table 16. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Addition/Subtraction (No Regrouping)--Accuracy

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	$\boxed{.61}$	.12	-.20	.34
	B	$\boxed{.66}$	.33	.06	$\boxed{.60}$
	TOTAL	$\boxed{.66}$	.24	-.22	$\boxed{.48}$
Direct Instruction	A	.32	.03	-.27	-.08
	B	$\boxed{.58}$	$\boxed{.43}$	.03	$\boxed{.52}$
	TOTAL	$\boxed{.53}$	.27	-.27	.21
Task Success	A	$\boxed{.52}$	.12	-.18	$\boxed{.70}$
	B	$\boxed{.57}$	.32	.08	$\boxed{.58}$
	TOTAL	$\boxed{.58}$	.23	-.20	$\boxed{.64}$

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* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N for total group = 44. Groups A & B formed by randomly dividing total in half (N=22 each) for cross-validation.

Table 17. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Addition/Subtraction (W/ Regrouping)--Fluency

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	.22	.26	-	.30
	B	-.17	.19	-.14	.03
	TOTAL	.08	.18	-.08	.14
Direct Instruction	A	.14	.27	-	.27
	B	-.26	.05	-.15	-.18
	TOTAL	.01	.17	-.09	.09
Task Success	A	.27	.27	-	.21
	B	-.24	.17	-.13	-.09
	TOTAL	.10	.17	-.08	.07

---

* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N for total group = 44. Groups A & B formed by randomly dividing total total in half (N=22 each) for cross-validation.

Table 18. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Addition/Subtraction (W/ Regrouping)--Accuracy

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	.14	.00	-	.10
	B	.28	-.05	.27	.21
	TOTAL	.07	-.01	.13	.16
Direct Instruction	A	.13	-.08	-	.04
	B	.04	-.23	.29	.00
	TOTAL	.22	-.13	.15	.05
Task Success	A	.14	-.03	-	-.17
	B	.28	-.03	-.28	$\boxed{.53}$
	TOTAL	.22	-.02	.12	.14

---

* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N for total group = 44. Groups A & B formed by randomly dividing total in hald (N = 22 each) for cross-validation.

and B. Only partial correlation coefficients for the total sample are discussed here.

ALT and addition/subtraction with no regrouping--ACCURACY. The pre/post correlation was .91 for the total sample, leaving about 18 percent of the variance unaccounted for. Significantly positive partial correlations were found for total time allocated (r = .64), total student engagement (r = .48) and high task success (r = .58). See Table 16.

ALT and addition/subtraction with regrouping--FLUENCY and ACCURACY. None of the correlations of ALT variables with achievement scores were significant here. Total time allocated and total student engagement time were positively correlated with fluency and accuracy in addition/subtraction computations involving regrouping, but non-significant. See Tables 17 and 18.

ALT and multiplication--FLUENCY. Medium task success (r = .44), student engagement in medium task success activites (r = .53), total student engagement (r = .51) and total direct instruction (r = .37) were significantly and positively related to achievement scores on multiplication fluency. Total time allocated and high task success were also positively related to achievement but non-significant. See Table 19.

ALT and multiplication--ACCURACY. Total time allocated (r = .50) and total student engagement (r = .40) were significantly and positively related to achievement in multiplication accuracy. Total direct instruction was also positively related to achievement (r = .34). See Table 20.

Table 19. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Multiplication--Fluency

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	.25	.22	.13	.34
	B	.13	$\boxed{.65}$	-.03	$\boxed{.57}$
	TOTAL	.17	$\boxed{.53}$	.03	$\boxed{.51}$
Direct Instruction	A	.10	.26	.16	.31
	B	.07	$\boxed{.49}$	.13	$\boxed{.43}$
	TOTAL	.07	$\boxed{.41}$	.10	$\boxed{.37}$
Task Success	A	.22	.31	.12	.39
	B	.26	$\boxed{.53}$	-.06	.08
	TOTAL	.24	$\boxed{.44}$	.01	.16

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* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N for total group = 44. Groups A & B formed by randomly dividing total in half (N=22 each) for cross-validation.

Table 20. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Multiplication--Accuracy

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	.14	.11	.02	.17
	B	.15	.39	$\boxed{.51}$	$\boxed{.50}$
	TOTAL	.14	$\boxed{.32}$	.29	$\boxed{.40}$
Direct Instruction	A	.19	.28	.04	.34
	B	.12	.16	$\boxed{.60}$	.33
	TOTAL	.15	.21	.22	$\boxed{.34}$
Task Success	A	.16	.15	.01	.39
	B	.25	.33	$\boxed{.46}$	$\boxed{.53}$
	TOTAL	.21	.28	.23	$\boxed{.50}$

---

* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N for total group ≈ 44. Groups A & B formed by randomly dividing total in half (N=22 each) for cross-validation.

ALT and division--FLUENCY. Total time allocated (r = .50), total student engagement (r = .32) and high task success (r = .43) were significantly and positively related to achievement in division fluency. See Table 21. Note also that student engagement during high task success activities (r = .42) and direct instruction during high task success activities (r = .49) were significantly and positively associated with division fluency achievement.

ALT and division--ACCURACY. Total time allocated (r = .43) and direct instruction in high task success activities were both signficantly and positively correlated to achievement in division computational accuracy.

ALT and math numeration. Note that data were available for Year 2 students only here (n = 20), and that the pre/post correlation left 14 percent residual to predict. No significant correlations were found, although some trends were evident. Note also that ALTOS data were necessarily aggregated across all math activities observed, since the numeration subtest of the Stanford Diagnostic Math Test covers multiple content areas that were coded on ALTOS. In other words, this constituted a less refined analysis, compared to the results of the Sterling Math Test where direct correspondences between ALTOS content codes and subtests existed. This fact, along with the high pre/post correlation on the Stanford (r = .93), may explain why there were no significant results with the standardized measure, but there were many with the criterion-referenced measure (Sterling). See Table 23.

ALT and reading comprehension. Note here, as above, data were available only for 20 Year 2 students; thus, with such a small sample for regression, only very tentative conclusions may be drawn. ALTOS data

Table 21. CORRELATION OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Division--Fluency

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	.13	-.06	$\boxed{.61}$	.16
	B	$\boxed{.69}$	-.07	.04	.40
	TOTAL	$\boxed{.42}$	-.00	.17	$\boxed{.32}$
Direct Instruction	A	.28	-.03	$\boxed{.60}$	.27
	B	$\boxed{.69}$	-.10	.03	.29
	TOTAL	$\boxed{.49}$	-.08	$\boxed{.30}$	.27
Task Success	A	.19	-.06	$\boxed{.66}$	$\boxed{.75}$
	B	$\boxed{.68}$	-.05	.01	.38
	TOTAL	$\boxed{.43}$	.02	.17	$\boxed{.50}$

---

* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N for total group = 44. Groups A & B formed by randomly dividing total in half (N=22 each) for cross-validation.

Table 22. CORRELATION OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Division--Accuracy

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	.15	-.05	.42	.15
	B	.25	.16	-.07	.26
	TOTAL	.20	.09	.05	.21
Direct Instruction	A	.36	-.11	.41	.23
	B	.41	-.06	-.04	.16
	TOTAL	$\boxed{.37}$	-.08	.15	.18
Task Success	A	.21	-.06	$\boxed{.49}$	$\boxed{.69}$
	B	.22	.16	-.09	.33
	TOTAL	.19	.06	.05	$\boxed{.43}$

---

* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N for total group = 44. Groups A & B formed by randomly dividing total in half (N=22 each) for cross-validation.

Table 23. CORRELATION OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Stanford Diagnostic Math Test--Numeration

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.21	.15	-.14	.16
Direct Instruction	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.07	-.25	-.18	-.16
Task Success	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.16	.24	-.11	-.07

---

* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N = 20, Year 2 students only.

were aggregated for activities that were coded as reading comprehension, reading practice and word meaning, either as the primary or secondary content area. However, reading comprehension as a construct is less well understood and more difficult to measure than a skill such as arithmetic computation. As can be seen in Table 24, no significant partial correlations were found between ALT variables and achievement scores in reading comprehension. It would be difficult for any significant correlations to occur, since the pre/post correlation on the Stanford Reading Comprehension Subtest was .97, leaving a mere 6 percent of variance in the posttest unaccounted for by the pretest.

ALT and oral reading fluency. The pre/post correlation here was .91, leaving 18 percent residual variance. Medium task success was significantly negatively correlated (r = -.48) with achievement scores in oral reading fluency. Similar negative correlations were found for student engagement and direct instruction in medium task success activities. High task success was positively related to achievement but not statistically significant. Even more puzzling is that total student engagement time is significantly negatively related to achievement in reading fluency. See Table 25. This latter finding is contrary to the general ALT hypothesis. These results imply that MMH students who are engaged a greater percentage of the time allocated to reading activities tend to gain less in oral reading fluency.

ALT and oral reading errors. Here the results seem to make more sense. One would expect to find a negative relationship, since achievement "gains" are indicated by reductions in error rates. See Table 26. Two correlations were significant in the expected direction: student engagement during high task success activities (r = -.31) and

Table 24. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED CAINS IN STUDENT ACHIEVEMENT*

Stanford Diagnostic Reading Test--Comprehension (Scaled Scores)

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.05	.28	-.21	.11
Direct Instruction	A	-	-	-	-
	B	-	-	-	-
	TOTAL	-.29	.39	-.26	-.11
Task Success	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.29	.30	-.21	-.34

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* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N=20. Year 2 students only.

Table 25. CORRELATICNS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Stanford Diagnostic Reading Test--Reading Fluency (words per minute)

Time in Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.20	$\boxed{-.43}$	-.19	$\boxed{-.38}$
Direct Instruction	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.13	$\boxed{-.36}$	-.29	$\boxed{-.34}$
Task Success	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.17	$\boxed{-.48}$	-.16	-.14

---

* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N=33, Years 1 and 2 combined.

Table 26. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Reading Errors (Words Per Minute)

Time in Activity in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	-	-	-	-
	B	-	-	-	-
	TOTAL	$\boxed{-.31}$	.09	.04	$\boxed{-.33}$
Direct Instruction	A	-	-	-	-
	B	-	-	-	-
	TOTAL	-.29	.11	-.01	-.21
Task Success	A	-	-	-	-
	B	-	-	-	-
	TOTAL	-.22	.16	.10	.05

---

* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N = 33, Years 1 and 2 combined.

total engaged time (r = -.33). Other similar trends were evident but failed to reach significance (e.g., high task success).

ALT and oral reading accuracy. No significant correlations were found between any of the ALT variables and achievement scores on oral reading accuracy, though expected positive trends do occur. See Table 27.

Final caveat. Regression analysis is limited by assumptions of linearity. Moreover, causal inferences are not warranted from correlational data. The reader should also note that mid-year posttests were used with the Year 2 students rather than end-of-year posttests for two reasons: 1) to prevent confounding by interventions that occurred right after the Year 2 mid-year posttests, and 2) so that the pre/post interval was roughly equivalent to that in Year 1 in order to combine the two samples.

Conclusions. Despite the limitations mentioned above, the results are encouraging. The findings between the relation of ALT and achievement for mildly handicapped students are very similar to those found for normal students in the Fisher, et al. (1978) BTES study. In fact, the magnitudes of partial correlation coefficients are often greater than those reported in the BTES study, thus "explaining" more of the residual variance in achievement scores. Had the sample size been three times as large in our study (making it roughly the same size as the BTES sample), and if the partial correlation coefficients remained constant, then many more would have been statistically significant. Given the overall consistency of our findings with those of the BTES study of normal children, despite our smaller sample size, it would appear that on the whole, the relationship of ALT and academic

Table 27. CORRELATIONS OF ALTOS VARIABLES WITH RESIDUALIZED GAINS IN STUDENT ACHIEVEMENT*

Reading Accuracy (pct. Correct)

Time In Activities in Which Task Success Was:

Variable	Group**	High	Medium	Low	Total Time
Student Engagement	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.09	.06	.05	.26
Direct Instruction	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.09	.03	.09	.19
Task Success	A	-	-	-	-
	B	-	-	-	-
	TOTAL	.12	.01	-.01	.13

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* Partial correlation coefficients--i.e., correlation of variable with posttest, after accounting for variance due to pretest.

** N = 39, Year 1 and 2 combined.

achievement in reading and math obtains for mildly handicapped students as well.

Results from N=1 Experiments

In both Years 2 and 3, experimental interventions were undertaken with participating teachers. The basic paradigm was to collect a series of baseline observations, meet individually with teachers to suggest changes which were hypotheszed to increase ALT, and then conduct a series of follow-up observations. The ALTOS was used for observations, and each student-teacher pair was observed on 4 to 6 different days, for approximately 1 1/2 to 2 hours per visit, during both baseline and follow-up periods. Twenty-five N=1 experiments were conducted during Year 2 and 13 similar experiments were conducted during Year 3, the latter set of studies intended as replications. The outcomes of those experiments are summarized below. In the following discussion, 'increases' means that the proportion of time the behavior was observed during the follow-up period was greater than that during baseline. 'Decreases' means that the proportion of time the behavior was observed during the follow-up period was less than that during baseline observations.

It should be noted that the descriptive results from ALTOS presented earlier suggested that direct instruction (DI) was highly related to student task engagement (EN). Moreover, it was hypothesized that increases in EN would also be associated with decreases in student low task success and with increases in high task success. Task success may be construed as a direct observational measure of student achievement in the classroom. These considerations guided the following investigations of relationships.

If DI increases, then EN increases or remains very high. During Year 2, 14 teachers increased the amount of direct instruction provided to mildly handicapped students in their classes. In 11 cases out of those 14, the target students also evidenced increases in task engagement. Thus, the success rate was 11/14 or 79 percent. It should be noted that 2 of those 11 students had baseline engagement rates in excess of 80 percent, and could not be reasonably expected to increase further (i.e., ceiling effects). These were the highest engagement rates observed that year.

During Year 3, this relationship between DI and EN occurred in 4 out of 6 studies, and none of those students had baseline engagement rates in excess of 80 percent. Thus, this pattern replicated during Year 3 as well.

The overall success rate for teachers in both Years 2 and 3 was 15 out of 20, or 75 percent. See Table 28.

If DI decreases, then EN decreases. We did not advise any teacher to decrease the amount of direct instruction provided to their MMH students. Nonetheless, 11 teachers did so during Year 3, and in 8 cases student engagement also decreased. This finding is very consistent with the above finding. That is, if teachers increase direct instruction, student engagement is also very likely to increase; but if they decrease direct instruction, student task engagement is very likely to decrease. These findings indicate that there may be a causal relationship between direct instruction and student engagement, or that something which co-occurs with direct instruction is causally related to engagement.

During Year 3 the pattern of decreased direct instruction resulting in decreased engagement occured in 4 out of 7 cases.

Table 28. EXPERIMENTAL RESULTS FROM N = 1 STUDIES IN YEARS 2 and 3*

Type of Experiment**	Year 2	Year 3	Overall
If DI ↑, then EN ↑ (or EN remains above 80%)	11/14 (.79)	4/6 (.67)	15/20 (.75)
If DI ↓, then EN ↓	8/11 (.73)	4/7 (.57)	12/18 (.67)
If EN ↑, LO ↓ (or LO remains 0)	11/12 (.92)	3/4 (.75)	14/16 (.88)
If DI ↑, LO ↓ (or LO remains 0)	10/12 (.83)	3/4 (.75)	13/16 (.81)
If EN ↑, HI ↑	7/12 (.58)	3/4 (.75)	10/16 (.63)

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* Ratios represent the proportion of studies in which the finding was verified (i.e., the relation was true)

** Key
DI = Direct Instruction
EN = Student Engagement
LO = Low Task Success
HI = High Task Success
= Increases
= Decreases

Overall, the chances of decreased direct instruction resulting in decreased student engagement are 12 out of 18, or 2/3.

If EN increases, then low task success decreases or does not occur. During Year 2 in 12 cases where student engagement increased, in 11 out of those 12 situations, the proportion of low task success decreased or low task success did not occur at all, for a hit rate of 92 percent. In about half the cases where student engagement increased, no instances of low task success were observed during either baseline or follow-up periods. These students were included here, since they could decrease low task success no further (floor effects).

During the Year 3 replications, increases in EN were associated with decreases in low task success in 3 out of 4 cases.

Overall, the chances of increased student engagement resulting in decreased or no low task success are almost 90 percent.

If DI increases, then low task success decreases or does not occur. Given that direct instruction appears to be causally related to student engagement, one would expect low task success to decrease or not occur, since increases in engagement are also associated with the latter. This was borne out in the data. During Year 2, in 10 out of 12 cases where direct instruction increased, student low task success decreased or remained zero. In the remaining 2 cases where DI increased, student low task success rates did not change and were non -zero.

During Year 3, the pattern between increased DI and decreased or no low task success was found to be true in 3 out of 4 cases.

The overall success rate for this pattern was 13/16 or 81 percent.

If EN increases, then high task success increases. One would hope that if low task success decreased, then high task success would increase, although this might not happen if instead medium task success increased. In 7 out of 12 cases where student engagement increased, the proportion of time spent in activities in which high task success was experienced also increased. One can infer, then, for the remaining 5 cases where EN increased, that 4 of those 5 increased the proportion of medium task success.

During Year 3, increases in EN resulted in increases in high task success in 3 out of 4 cases.

Overall, the success rate for this pattern is 10/16 or 63 percent.

Summary. The experimental findings from the 38 N=1 studies conducted over a two-year period tend to support the general ALT hypothesis for MMH students. These results were consistent with earlier descriptive studies in which no experimental interventions were introduced. These findings indicate that when student task engagement is higher, then low task success is likely to be lower or non-existent and that high task success is likely to be greater. Higher rates of daily high task success tend to be positively correlated with long range gains in achievement. Direct instruction is one variable over which teachers have some control. If they increase direct instruction, MMH students are likely to increase their engagement rates, and if teachers decrease direct instruction, those students engagement rates tend to drop.

Direct instruction appears to occur with greatest frequency in resource room settings where class size is relatively small and teachers often work intensively for one to two hours per day with MMH students in small groups or individually. Less direct instruction of MMH students (either in groups or individually) tends to occur in regular classroom settings, and interestingly in self-contained classrooms as well. All other things equal, class size seems to be a mediating factor. Given the general findings on the inverse relation between class size and academic achievement as corroborating evidence, it would appear to be advantageous (in terms of academic achievement) for MMH students to spend some time in smaller class sizes, where more direct instruction and individualization can occur.

SECTION 5

SUMMARY OF CONCLUSIONS AND DISSEMINATION EFFORTS

SECTION 5

Overall, the findings from this study tend to support the relationship between the achievement of mildly handicapped students and the amount of academic learning time provided. The results were generally consistent with the earlier BTES studies, which indicated that high rates of daily task success were positively correlated with long range gains in achievement. We found that when student task engagement is higher, low task success is likely to be lower and high task success is generally higher.

General Conclusions

Perhaps the most dramatic overall ALT finding is the relationship of direct instruction* and student engagement. Students were found to be 19 times more likely to be engaged than not during direct instruction, whereas they are only 1 1/2 times as likely to be engaged than not during non-direct instruction. This pattern remains constant across all delivery systems. Given that teachers spend only about 40% of their time directly instructing a given mildly handicapped student or a group including him/her, this finding seems even more significant.

Clearly, instruction is more individualized in the smaller resource and special settings than in regular classroom settings, as would be expected by virtue of class size alone. A relatively greater number of activities devoted to reading instruction occur in resource and special classrooms.

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*Direct instruction means academic monitoring, feedback, questioning, explaining, structuring/directing and task engagement feedback to the target student or group which includes TS.

Student task success, a direct observational measure of classroom task achievement in reading and math, did not differ much across the four delivery systems. Although somewhat more high task success occurred in the Full-time Regular Classroom delivery system, this finding must be tempered with the fact that those students were the least handicapped. More importantly, in 10% of the reading/math activities mildly handicapped students experienced low task success (almost all errors), whereas the typical "normal" student experiences low success less than 1% of the time.

Mildly handicapped students were observed on task about 3/4 of the time during reading/math activities. The large majority of off-task behavior occurred during independent seatwork. Approximately 60% of the reading/math activities occurred in seatwork settings (i.e., self-paced).

Instructor behaviors most highly associated with minimal low task success were group focused academic feedback, planned explanations and structuring/directing. Thus, the following relationships appear to obtain:

--When directed instruction is provided, students are 19 times more likely to be engaged than not.

--The likelihood of low task success is less when the instructor provides some group-focused academic feedback, planned explanation, and structuring/directing.

One way of interpreting the latter finding is that, for a typical 16 minute reading/math activity, when the teacher provides about 2 1/2 minutes of group-focused feedback, explanation, and structuring/directing, students are likely to perform very well or medium well on the tasks. On the other hand, when less than 1 minute of group-focused feedback, explanation, and structuring/directing occurs, students are relatively more likely to perform very poorly on the tasks. Of course, there are other factors which probably influence task success to a greater extent, but these instructor behaviors seem to help. Perhaps the following sums it up best: Students do not succeed on a learning task if:

--They do not try.

--They do not understand what it is they are to do and/or how to do it.

--They do not know if they are doing it correctly.

These conditions appear to be neccessary though not sufficient for task achievement.

Direct instruction was found to be one variable over which teachers have some control. In a series of 38 experimental studies, we found increases in direct instruction to be highly related to increased student engagement. For example, we found that in 75% of the studies where teachers increased the amount of direct instruction, student engagement increased. Conversely, when teachers inadvertently diminished the amount of direct instruction, student engagement decreased in 67% of the cases. These findings underscore the importance of this variable and influenced the development of the teachers guide for increasing student engagement which was developed and field tested during year 3.

Overall, the findings hold a great deal of promise for special educators interested in developing effective classroom environments to maximize the probability that mildly handicapped students will succeed academically.

Dissemination Activities

Publications

Frick, T., Rieth, H. J., & Polsgrove, L. The use of microcomputers in training special education teachers, Peabody Journal of Education, 1983.

Rieth, H. J., Polsgrove, L., & Semmel, M. I. Instruction in the regular classroom: Variables that make a difference. *Exceptional Education Quarterly*, 1981, *2*, 61-82.

Rieth, H. J., Polsgrove, L., Semmel, M. I., & Cohen, R. An experimental analysis of the effects of increased instructional time on the academic achievement of a "behaviorally disordered" high school student. *Monograph in Behavior Disorders*, 1980, *3*, 134-141.

Rieth, H. J., Polsgrove, L., & Semmel, M. I. A review of research on the relationship of instructional time and achievement: Implications for research and practice in special education. *Education Unlimited*, 1979, *2*, (6), 53-57.

Presentations

Herbert J. Rieth

1. Indiana State Council for Exceptional Children. *An analysis of classroom activities involving handicapped children.* Indianapolis, Indiana, February, 1983.

2. Monroe County Teachers Inservice Program. *Strategies for maximizing the amount of academic learning time provided for mildly handicapped students.* Bloomington, Indiana, December, 1982.

3. Council for Children with Behavior Disorders, Programming for the Developmental needs of Adolescents with Behavior Disorders. *Academic learning time and research in applied settings: Results and implications*. Minneapolis, Minnesota, September, 1982.

4. American Educational Research Association. *Issues in secondary level Special Education.* New York, March, 1982.

5. Indiana State Council for Exceptional Children. *An analysis of academic learning time and achievement of mildly handicapped students.* Indianapolis, Indiana, February, 1982.

6. Smith Research Conference. *Least restrictive environments -- influential academic and social variables.* Bloomington, Indiana, February, 1982.

7. Conference on Severe Behavior Disorders of Children and Youth. *A model program for secondary students with learning and behavior problems.* Tempe, Arizona, November, 1981.

8. California Special Education Administrators of County Offices. *Least restrictive environment: Academic issues*. Santa Barbara, California, July, 1981.

9. Kentucky State CEC. *Programming for academically and socially handicapped inner city secondary students*. Louisville, Kentucky, March, 1981.

10. Conference on Severe Behavior Disorders of Children and Youth. *An analysis of the effects of interventions designed to increase academic learning time on the reading and math achievement of delinquent and severely behavior disordered youth.* Tempe, Arizona, November, 1980.

11. Indiana Association of Children with Learning Disabilities. *A model secondary school program for children with learning disabilities.* Indianapolis, Indiana, October, 1980.

12. Southern Santa Barbara County Special Education Teachers. *Implications of research on academic learning time for program planning for mildly handicapped students*. Santa Barbara, California, July, 1980.

13. Northern Santa Barbara County Special Education Teachers. *Impact of academic learning time on the academic learning behavior of mildly handicapped students.* Pismo Beach, California, July, 1980.

14. Association for Children with Learning Disabilities, International Conference. *Academic learning time and the mainstreamed child: Research review and case studies.* Milwaukee, Wisconsin, February, 1980.

15. Teacher Educators of Children with Behavior Disorders. *Studies involving a comparison of actual learning times in teaching secondary students word recognition skills in a resource room setting*. Tempe, Arizona, November, 1979.

16. Monroe County Consulting Teachers. *Data-based strategies for assessing academic and social behavior.* Bloomington, Indiana, August, 1979.

17. Indiana University Elementary Educaion Seminar. *Strategies for complying with PL 94-142.* Bloomington, Indiana, July, 1979.

REFERENCES

REFERENCES

Bennett, N. *Teaching styles and pupil progress.* London: Open Books, 1976.

Berliner, D. E. *Instructional time in research on teaching.* Paper presented at the meeting of the American Educational Research Association, 1977.

Block, J., & Burns, R. *Time in school learning: An instructional psychologist's perspective.* Paper presented at the annual meeting of the American Educational Research Association, Washington, D. C., 1975.

Bond, G. L., & Dykstra, R. The cooperative research program in first-grade reading instruction. *Reading Research Quarterly*, 1967, *2*, 5-142.

Burdett, C., & Fox, W. L. *Measurement and evaluation of reading behavior: Word recognition, oral reading and comprehension.* Austin, Texas: Austin Writers Group, 1973.

Carnine, D., & Silbert, J. *Direct instruction reading.* Columbus, Ohio: Merrill, 1979.

Carroll, J. B. A model of school learning. *Teachers College Record*, 1963, *64*, 723-733.

Carroll, J. B., & Spearritt, D. *A study of a model of school learning.* Monograph No. 4, Center for Research and Development in Educational Differences, Harvard University, 1967. (ERIC Document in Reproduction Service No. ED 045 477).

Coleman, J. S. *Equality of educational opportunity.* Washington, D. C., U. S. Government Printing Office, 1966.

David, J. L. *Summer study: A two part investigation of the impact of exposure to schooling on achievement growth.* Unpublished doctoral dissertation, Harvard University, 1974.

Filby, N. N., & Dishaw, M. *Development and refinement of reading and mathematics tests for the study of reading and mathematics instruction in Grades 2 and 5* (Technical Report III-1). Beginning Teacher Evaluation Study, Far West Laboratory, San Francisco, 1975.

Filby, N. N., & Dishaw, M. *Refinement of reading and mathematics tests through an analysis of reactivity* (Technical Report III-6). Beginning Teacher Evaluation Study, Far West Laboratory for Educational Research and Development, San Francisco, 1976.

Fisher, C. W., Berliner, D. C., Filby, N. N., Marliave, R., Cohen, L. S., Deshaw, M. M., & Moore, J. E. *Teaching and learning in the elementary school: A summary of the Beginning Teacher Evaluation Study.* San Francisco: Far West Labs, 1978.

Fisher, C. W., Filby, N. N., & Marliave, R. S. *Instructional time and student achievement in second grade reading and mathematics.* Paper presented at the meeting of the American Educational Research Association, 1977.

Fox, R. G. *The effects of peer tutoring on oral reading behavior of underachieving fourth grade pupils.* Unpublished dissertation, University of Kansas, 1974.

Glass, G. V., Willson, V. L., & Gottman, J. M. *Design and analysis of time series experiments.* Boulder, Colorado: Colorado University Press, 1975.

Hall, R. V., Delquadri, J., & Harris, J. *Opportunity to respond: A new focus in the field of applied behavior analysis.* Paper presented at the Midwestern Association for Applied Behavior Analysis, Chicago, 1977.

Harneschfeger, A., & Wiley, D. E. A perspective for research policy. *Educational Technology*, 1978, *13*, 46-49.

Harris, A. J., Morrison, C., Serwer, B., & Gold, L. *A continuation of the CRAFT project: Comparing reading approaches with disadvantaged urban Negro children in primary grades.* New York: City University of New York, 1968. (ERIC Document Reproduction Service No. ED 101 297).

Harris, A. J., & Serwer, B. *Comparison of reading approaches in first grade teaching with disadvantaged children.* (The CRAFT project). New York: City University of New York, 1966.

Hess, R. & Takanishi, R. *The relationship of teacher behavior and school characteristics to student engagement* (Technical Report 42). Center for Research and Development in Teaching, Stanford University, 1974.

Lomax, R. G., & Cooley, W. W. *The student achievement instructional time relationship.* Paper presented at American Educational Research Association Meeting, San Francisco, California, 1979.

Jencks, C. S. *Inequality: A reassessment of the effect of family and schooling in America.* New York: Basic Books, 1972.

Karweit, N. Quantity of schooling: A major educational factor? *Educational Researcher*, 1976, *5*(2), 15-17.

McDonald, F. J. *Beginning teacher evaluation study, phase II: Summary report.* Princeton, New Jersey: Educational Testing Service, 1975.

Mosteller, F. & Moynehan, D. P. (Eds.) *On equality of educational opportunity.* New York: Random House, 1972.

Rieth, H., Polsgrove, L. & Semmel, M. I. A review of the relationship between instructional time and academic achievement: Implications for research and practices in special education. *Education Unlimited.* In press.

Rosenshine, B. V. & Berliner, D. C. Academic engaged time. *British Journal of Teacher Education*, 1978, *4*, 3-16.

Semmel, M. I. *Promising steps teachers may take in working with handicapped students*. London, Ontario: University of Western Ontario. In press.

Stallings, J. A., & Kaskowitz, D. *Follow-through classroom observation evaluation, 1972-1973*. Menlo Park, California: Stanford Research Institute, 1974.

Wiley, D. E. *Another hour, another day: Quantity of schooling, a potent path for policy*. Studies of Educative Processes, No. 3, Chicago, July, 1973.

Wiley, E. E., & Harneschfeger, A. Explosion of a myth: Quantity of schooling and exposure to instruction, major educational vehicles. *Educational Researcher*, 1974, *3*, 7-12.

APPENDICES

APPENDIX A

ALTOS CODING FORMS

(Complete this sheet for each teacher/classroom target student goes to)

ALTOS IDENTIFICATION SHEET

Date: ☐☐☐☐☐☐

Current Time: ☐ :

ID INFORMATION

Observer: ______________________ ID# ☐☐

Teacher: ______________________ ID# ☐☐

Target Student: ______________________ ID# ☐☐

Class Type: 1 = Regular 3 = Self-Contained ☐

2 = Resource 4 = Other ________

Class Size Today ☐☐

COMMENTS

General Comments: ______________________

____

____

____

____

____

REMINDERS

CATEGORIES FOR REAL-TIME CODING OF

TARGET STUDENT, INSTRUCTOR AND FOCUS

1. Classification: Learner Moves (for target student, and only coded in Math and Reading)

Categories:
- EW. Engaged - Written Response
- EO. Engaged - Oral Response
- EC. Engaged - Covert Response
- ED. Engaged - With Directions About Task
- NI. Non-Engaged - Interim
- NW. Non-Engaged - Wait
- NO. Non-Engaged - Off-task

Priority Hierarchy
1. EO, EW
2. EC
3. ED
4. NI, NW, NO

2. Classification: Instructor Moves (only coded when instructional move is relevant to target student in math and reading)

Categories:
- AM. Academic Observational Monitoring
- AF. Academic Feedback
- AQ. Academic Questioning
- XN. Explanation - Need
- XP. Explanation - Planned
- SD. Structuring/Directing
- TF. Task Engagement Feedback
- NU. Null

Priority Hierarchy
1. XN
2. XP
3. AF, AQ
4. AM
5. SD
6. TF
7. NU

3. Classification: Focus of Instructor Move

Categories:
- TS. Target Student
- GR. Group (of which Target Student is a member)
- NU. Null

(Complete this sheet for each activity--do not include transition time)

ALTOS
EDUCATIONAL ACTIVITY SHEET

TIME STARTED: ☐ :

SETTING

Number of students engaged in same activity as TS, including TS ☐☐

TS Pacing { 1 = SELF-PACED, 2 = OTHER PACED } ☐

TARGET STUDENT

Describe the major task(s) that the TS does in this activity: ________

____

____

____

____

____

____

Predominant TS Activity: (Use more than one code, if necessary) ☐☐☐

- 1 = ORAL READING
- 2 = SILENT READING
- 3 = RECITING
- 4 = LISTENING
- 5 = DISCUSSING
- 6 = WRITING
- 7 = OTHER ________

Task Difficulty for TS: { 1 = EASY 2 = MEDIUM 3 = HARD } ☐

TEACHER

TS Instructor: ☐

- 1 = TEACHER
- 2 = PEER (TUTOR)
- 3 = AIDE (ADULT)
- 4 = SELF-INSTRUCTIONAL MATERIALS
- 5 = TEACHING MACHINE/TUTOR (A/V)
- 6 = NO INSTRUCTOR

Describe the major task(s) that the instructor does in this activity:

____

____

____

____

____

____

Predominant Instructor Activity with TS: (Use more than one code, if necessary) ☐☐☐

- 1 = LECTURING
- 2 = DISCUSSING
- 3 = PROMPTING
- 4 = MODELING/DEMO
- 5 = TESTING
- 6 = SUPERVISING
- 7 = OTHER ____________

(OVER)

DON'T FORGET TO COMPLETE OTHER SIDE!

CURRICULUM

PRIMARY	☐☐
SECONDARY	☐☐

Content (Curriculum Subject Matter):

Note: Use SECONDARY for coding reading/math only when PRIMARY is some other subject matter (e.g., science, social studies) that requires TS reading/math related tasks.

Reading: 10. Decoding/Phonics
11. Word Structure
12. Word Meaning
13. Comprehension
14. Reading Practice
15. Spelling
16. Grammar
17. Composition/Creative Writing
18. Reading Related - Other
19. Reading Below Test Level

Math: 20. Addition/Subtraction (No Regrouping)
21. Addition/Subtraction (With Regrouping)
22. Computational Transfer
23. Place Value/Numerals
24. Multiplication
25. Division
26. Fractions/Decimals
27. Spatial Application
28. Verbal Application (Word Problems)
29. Math Related - Other
30. Math Below Test Level

Other Academic: 40. Physical/Biological Sciences
41. Social Sciences
42. Foreign Language

Non-Academic: 50. Art
51. Music
52. Technological Arts
53. Physical Education (Supervised)
54. Perceptual Development
55. Management/Procedural
56. Recreation/Break
57. Personal Experiences/Feelings
58. Other ____________________

Describe the content and curriculum materials used by TS in this activity:

____

____

____

____

____

Time Stopped: ☐ : ☐

DON'T FORGET TO COMPLETE OTHER SIDE!

(*Code only in reading/*
math related tasks)

Side 1

ALTOS
REAL-TIME CODING SHEET

TIME	1. LEARNER MOVES	INSTRUCTOR		NOTES	
		2. MOVES	3. FOCUS		
:					1
:					2
:					3
:					4
:					5
:					6
:					7
:					8
:					9
:					10
:					11
:					12
:					13
:					14
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:					27
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:					29
:					30
:					31
:					32
:					33
:					34

(*Code only in reading/*
math related tasks)

Side 2

ALTOS
REAL-TIME CODING SHEET

TIME	1. LEARNER MOVES	INSTRUCTOR		NOTES	
		2. MOVES	3. FOCUS		
:					35
:					36
:					37
:					38
:					39
:					40
:					41
:					42
:					43
:					44
:					45
:					46
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:					66
:					67
:					68

APPENDIX B

ALTOS OBSERVER TRAINING MANUAL

ALTOS Observer Reference Manual:
Academic Learning Time Observation System

Ted Frick Herbert J. Rieth

Project ALT

Center for Innovation in Teaching the Handicapped
Indiana University
Bloomington, Indiana

Acknowledgement

This observation system and manual are adaptations of those developed in the Begining Teacher Evaluation Study (BTES) by Marliave, R., Fisher, C., Filby, N. and Dishaw, M. *The development of instrumentation for a field study of teaching*: Technical Report I-5, February, 1977, pps. B-1, B-124. Their definitions of reading and math content categories for grades 2 and 5 are combined here into a single set of definitions. Their definitions of learner moves, instructor moves, instructor focus, task difficulty, and pacing are also used here, although the examples are original here. The coding procedures, coding forms, and remaining categories used herein depart from those in the BTES materials cited above.

Table of Contents

Introduction 1
Flowchart for ALTOS Coder Decision Making. 3
ALTOS Identification Sheet 5
ALTOS Educational Activity Sheet 9
    Time Started and Stopped 11
    Number of Students Engaged in Same Activity as TS*. 12
    TS Pacing 12
    Major Task(s) that TS Does in this Activity 12
    Predominant TS Activity 13
    Task Difficulty for TS. 14
    TS Instructor 16
    Major Task(s) that Instructor Does with TS in this Activity 17
    Predominant Instructor Activity with TS 17
    Reading Content Categories Summary. 20
    Reading Content Categories Definitions. 23
    Math Content Categories Summary 35
    Math Content Categories Definitions 36
    Other Academic and Non-Academic Content Summary 45
    Other Academic and Non-Academic Content Definitions 46
ALTOS Real-Time Coding Sheet 49
    Definitions of Learner Moves. 51
    Definitions of Instructor Moves 53
    Definitions of Instructor Focus 57
    Procedures for Real-Time Coding in Math/Reading 58
    What to Do When Multiple Events Occur at the Sampling Point: Priority Hierarchies 60
    Ground Rule for Real-Time Coding of Math/Reading in Other Content Areas. 61

---

* TS refers to the target student--the single student being observed and coded.

Introduction to ALTOS

The Academic Learning Time Observation System (ALTOS) was designed to characterize how elementary level students spend their time during the school day. The information gained from direct classroom observation and coding on ALTOS will be correlated with student achievement information obtained before and after the period of classroom observations.

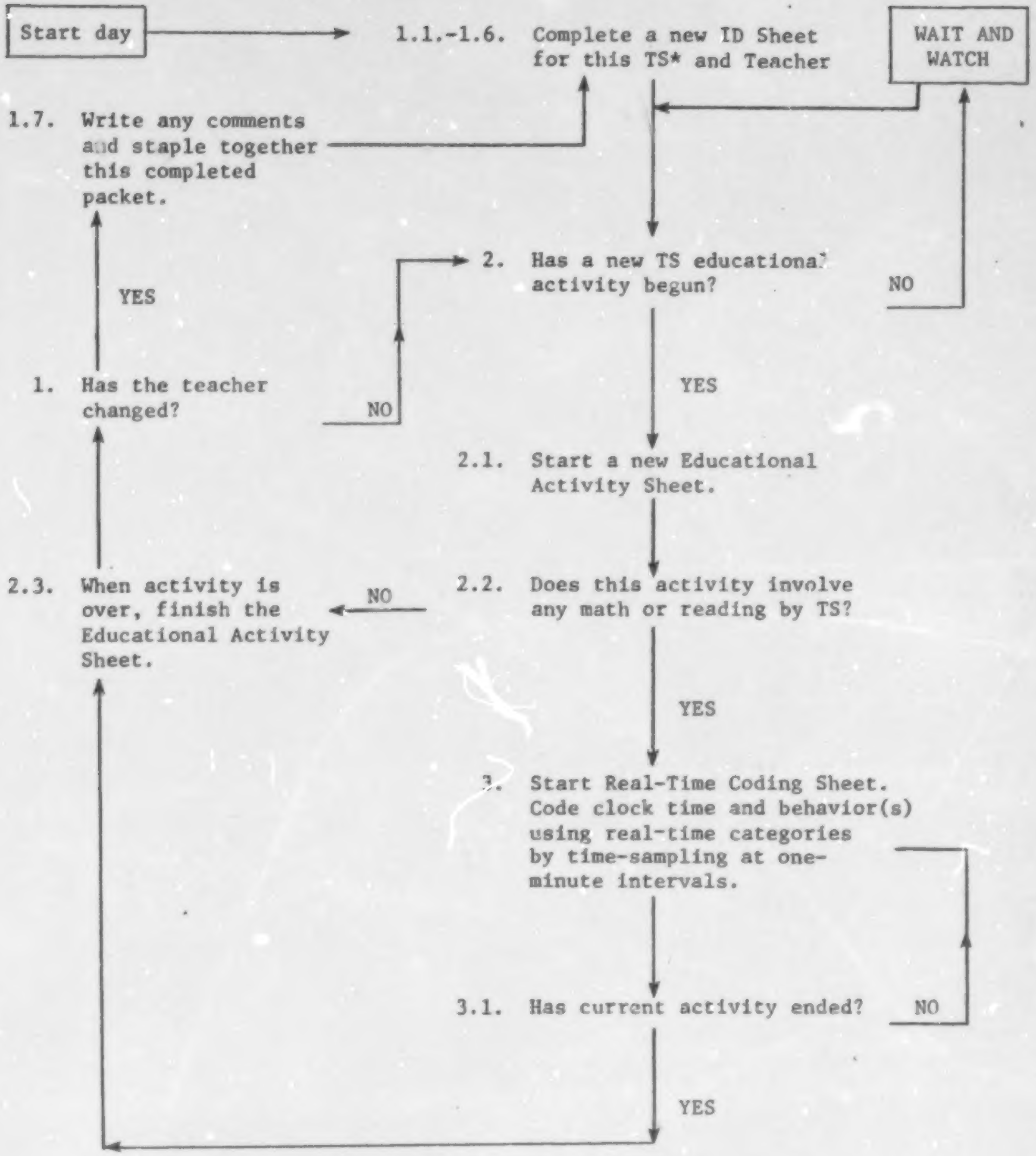
First, we want to know the time allocated to different activities (e.g., language arts, math, science, recess) throughout the day. Next, we are interested in student and teacher engagement time during those activities which include math or reading related tasks. And, most importantly, we want to know how well students perform on those tasks.

There are three kinds of ALTOS coding forms used: 1) ALTOS Identification Sheet; 2) ALTOS Educational Activity Sheet; and 3) ALTOS Real-Time Coding Sheet. To accurately and consistently use these forms, extensive observer training is required. Furthermore, observers must have adequate knowledge of elementary reading and mathematics content (through sixth grade) in order to judge the success of student performance in these areas.

Schema 1.

Flowchart for ALTOS

Coder Decision Making


Start day
1.1.-1.6. Complete a new ID Sheet for this TS* and Teacher
WAIT AND WATCH
1.7. Write any comments and staple together this completed packet.
YES
2. Has a new TS educational activity begun?
NO
1. Has the teacher changed?
NO
YES
2.1. Start a new Educational Activity Sheet.
2.3. When activity is over, finish the Educational Activity Sheet.
NO
2.2. Does this activity involve any math or reading by TS?
YES
3. Start Real-Time Coding Sheet. Code clock time and behavior(s) using real-time categories by time-sampling at one-minute intervals.
3.1. Has current activity ended?
NO
YES

---

*Note: TS is the target student to be observed throughout the day.

(Complete this sheet for each teacher/classroom target student goes to)

ALTOS IDENTIFICATION SHEET

Date: ☐☐☐☐☐☐

ID INFORMATION

Observer: ______________________ ID# ☐☐

Teacher: ______________________ ID# ☐☐

Target Student: ______________________ ID# ☐☐

Class Type: 1 = Regular 3 = Self-Contained 2 = Resource 4 = Other ________ ☐

Class Size Today ☐☐

COMMENTS

General Comments: ______________________

REMINDERS

CATEGORIES FOR REAL-TIME CODING OF TARGET STUDENT, INSTRUCTOR AND FOCUS

1. Classification: Learner Moves (for target student, and only coded in Math and Reading).

Categories:

EW.	Engaged - Written Response
EO.	Engaged - Oral Response
EC.	Engaged - Covert Response
ED.	Engaged - With Directions About Task
NI.	Non-Engaged - Interim
NW.	Non-Engaged - Wait
NO.	Non-Engaged - Off-task

Priority Hierarchy

1. EW, EO
2. EC
3. ED
4. NI, NW, NO

2. Classification: Instructor Moves (only coded when instructional move is relevant to target student in math and reading)

Categories:

AM.	Academic Observational Monitoring
AF.	Academic Feedback
AQ.	Academic Questioning
XN.	Explanation - Need
XP.	Explanation - Planned
SD.	Structuring/Directing
TF.	Task Engagement Feedback
NU.	Null

Priority Hierarchy

1. XN
2. XP
3. AF, AQ
4. AM
5. SD
6. NU

3. Classification: Focus of Instructor Move

Categories:

TS.	Target Student
GR.	Group (of which Target Student is a member)

ALTOS IDENTIFICATION SHEET

1. General: The identification sheet needs to be completed once per teacher/classroom change for the target student (TS). For example, if TS goes to Mrs. Jones' classroom at 8:30 a.m., you would complete the ID sheet then. As long as TS is in Mrs. Jones' class, this sheet identifies to whom the other coding forms completed during that time refer. Suppose at 10:30 TS goes to music class (or the music teacher comes to TS's classroom). At this time you would staple together the previously completed ID sheet for Mrs. Jones and other coding forms, to finish that coding packet. Then you would fill out a new ID sheet for the music teacher.

1.1. Date: Enter today's date--six digits (e.g., $\overbrace{\boxed{1}\boxed{1}}^{\text{mo.}}\overbrace{\boxed{2}\boxed{0}}^{\text{day}}\overbrace{\boxed{8}\boxed{0}}^{\text{year}}$).

1.2. Observer Name: Write your name here and your ID# in the double box to the right. See master list for ID#'s.

1.3. Teacher Name: Write the name of the teacher of the classroom you are now in and his/her ID#. See master list for assigned ID#'s.

1.4. Target Student (TS): The target student is the only student you will be observing. Write his/her name and ID#.

1.5. Class Type: You should know the class type from the master list. Enter the class type code number in the box to the right.

1.6. Class Size Today: Count the total number of students present, including TS. Enter that number in the double box to the right.

1.7. General Comments: This is to be completed when you staple the packet together (i.e., there is a teacher change or it is the end of the day). Note anything that seemed extraordinary or unusual about the coding period you just finished for this packet.

1.8. Categories for Real-Time Coding: This is for your later reference, if needed, when you do real-time coding of teacher and student behavior in reading/math related activities. This has nothing to do with the ID sheet, but was put here for convenient reference.

(*Complete this sheet for each activity--do not include transition time*)

ALTOS
EDUCATIONAL ACTIVITY SHEET

TIME STARTED: ☐☐ : ☐☐

SETTING

Number of students engaged in same activity as TS, including TS ☐☐

TS Pacing
1 = SELF-PACED (INDEPENDENT SEAT WORK)
2 = OTHER PACED (GROUP WORK)
☐

TARGET STUDENT

Describe the major task(s) that the TS does in this activity: ________

____

____

____

____

____

____

Predominant TS Activity: (Use more than one code, if necessary)
1 = ORAL READING
2 = SILENT READING
3 = RECITATION
4 = LISTENING
5 = DISCUSSION
6 = WRITING
7 = OTHER ________
☐☐☐

Task Difficulty for TS: 1 = EASY 2 = MEDIUM 3 = HARD ☐

TEACHER

TS Instructor:
1 = TEACHER
2 = PEER (TUTOR)
3 = AIDE (ADULT)
4 = SELF-INSTRUCTIONAL MATERIALS
5 = TEACHING MACHINE/TUTOR (A/V)
6 = NO INSTRUCTOR
☐

Describe the major task(s) that the instructor does in this activity:

____

____

____

____

____

____

Predominant Instructor Activity with TS: (Use more than one code, if necessary)
1 = LECTURING
2 = DISCUSSING
3 = PROMPTING
4 = MODELING/DEMO
5 = TESTING
6 = SUPERVISING
7 = OTHER ________
☐☐☐

(OVER)

DON'T FORGET TO COMPLETE OTHER SIDE!

PRIMARY ☐☐

SECONDARY ☐☐

CURRICULUM

Content (Curriculum Subject Matter):

Note: Use SECONDARY for coding reading/math only when PRIMARY is some other subject matter (e.g., science, social studies) that requires TS reading/math related tasks.

Reading:
- 10. Decoding/Phonics
- 11. Word Structure
- 12. Word Meaning
- 13. Comprehension
- 14. Reading Practice
- 15. Spelling
- 16. Grammar
- 17. Composition/Creative Writing
- 18. Reading Related - Other
- 19. Reading Below Test Level

Math:
- 20. Addition/Subtraction (No Regrouping)
- 21. Addition/Subtraction (With Regrouping)
- 22. Computational Transfer
- 23. Place Value/Numerals
- 24. Multiplication
- 25. Division
- 26. Fractions/Decimals
- 27. Spatial Application
- 28. Verbal Application (Word Problems)
- 29. Math Related - Other
- 30. Math Below Test Level

Other Academic:
- 40. Physical/Biological Sciences
- 41. Social Sciences
- 42. Foreign Language

Non-Academic:
- 50. Art
- 51. Music
- 52. Technological Arts
- 53. Physical Education (Supervised)
- 54. Perceptual Development
- 55. Management/Procedural
- 56. Recreation/Break
- 57. Personal Experiences/Feelings
- 58. Other ____________________

Describe the curriculum materials used by TS in this activity: ______

____

____

____

____

____

Time Stopped: ☐☐ : ☐☐

DON'T FORGET TO COMPLETE OTHER SIDE!

ALTOS EDUCATIONAL ACTIVITY SHEET

2. General: An educational activity is something the TS is expected to do by the teacher during some period of time. Usually the activity can be characterized by one of the curriculum content categories listed on the reverse side of the educational activity sheet. We are not interested in describing transitions between activities here, but describing for each activity the setting, the TS tasks, the instructor tasks, and the curriculum content and materials. You will complete this educational activity context sheet whenever the activity changes for the target student. You will know the activity changes whenever there is a change in one or more of the: setting, TS task, instructor, instructor task, or curriculum content. For example, there would be an activity change if TS was in a small oral reading group and then moved to do independent seatwork on phonics, because both the setting (pacing) and curriculum content changed for TS. Or, if TS finished his/her phonics worksheet and then began working on an addition facts worksheet, there would be an activity change because of a change in the curriculum content. Or, if the teacher had been giving a demonstration at the board on how to solve fractions problems and then assigned similar problems in the math text for TS to do at his/her seat, there would be a change in the setting from other-paced to self-paced; in the TS task from listening to writing; in the instructor from teacher to no instructor; and in the instructor activity from modeling/demo to supervising. You always judge the activity from the point of view of TS and what is available for TS to attend to and do.

2.1. Time Started: This is the time at which the current activity for TS ACTUALLY begins. Time Stopped will indicate when this activity ACTUALLY ends. It is very important to accurately record starting and stopping times (to the nearest minute). This allows us to know how much time was allocated for this particular activity. Do not include transition time here, such as getting or putting away materials or supplies needed for the activity, moving to a different area of the classroom between activities, cleaning up, erasing board, lining up, etc.

2.2. Now, the most important thing to determine is whether the current TS activity includes any reading or math, even though the subject matter may be named something else, such as social studies or science. If the activity does require TS to do reading or math, then you immediately begin real-time coding, using the Real-Time Coding Sheet, until the current activity is over. At that time, you will return to the Educational Activity Sheet and immediately record Time Stopped and then complete all remaining items on the Educational Activity Sheet.

If the current activity does not include any reading or math, then you do not use the Real-Time Coding Sheet. In this case you simply observe TS and other students (to disguise your focus) until the activity is over, and then record Time Stopped and complete all remaining items.

2.3. Number of Students Engaged in Same Activity as TS: How many students in the class are currently expected to be engaged in exactly the same activity as is TS? Count them, including TS, and enter the number in the right-hand double box. For example, if TS is in an oral reading group of 8 students, enter 08. Or, if the entire class of 27 is doing the same math worksheet, enter 27. Or, if the teacher is drilling TS on sight vocabulary words with flashcards and the rest of the class is doing something else, enter 01.

2.4. TS Pacing: What is essential here is who determines the TS pacing of work during the activity. If TS determines the pacing, then it is self-paced (code = 1). For example, if TS is working at his seat on a math worksheet, (i.e., independent seatwork), this would be self-paced. Or, if TS is working independently in the map area on his geography, even though several other students are also working there at the same time, this would be self-paced.

On the other hand, if someone or something else mostly determines the TS pacing, then it is other-paced (code = 2). For example, if the teacher or other students are reading a story aloud in reading group, this would be other-paced. Other examples of other-paced: teacher is giving a demonstration; TS is watching a movie; TS is being drilled on math facts by a peer; teacher is giving a spelling test to the class; TS is listening to a cassette tape and following along by silently reading the spoken text. In other-paced activities the rate of TS's engagement is determined externally on a moment by moment basis most of the time.

Do not code externally imposed time limits for an entire activity as other-paced. For example, if the teacher tells the whole class they have 15 minutes to individually copy their spelling words, this would be self-paced, since TS can do the copying independently at his own rate during the 15-minute period.

Enter the pacing code in the box to the right.

2.5. Describe the major tasks that TS does in this activity: In your own words, list the major behaviors in which TS engages in this activity. Be precise. For example, in oral reading: most of the time TS followed along in his reader while other students read aloud. He was asked to read two paragraphs aloud by the teacher and only made a few mistakes, although his reading rate was relatively slow, compared to others'. Occasionally, he was asked by the teacher to answer a question about the story (comprehension questions).

Another example, math seatwork: TS was given a math worksheet, with pictures of pies (or circles) with slices marked. For each written fraction (e.g., 3/4), he was supposed to color in the proportion of the pie corresponding to the fraction. He did very poorly on this. He colored each slice a different color. Apparently he didn't understand the directions or he doesn't understand the basic concepts of fractions.

2.6. Predominant TS Activity: Try to determine which of the following was the predominant specific TS activity:

(1) Oral reading: TS reads text aloud or visually follows along as someone else does so.

(2) Silent reading: TS reads text silently by himself/herself and no one else is reading that text aloud.

(3) Reciting: TS is required to verbally repeat or speak aloud something memorized as all or part of the lesson before the instructor, e.g., spelling aloud, given a word; saying answers to math flash card drill; reciting memorized poem in front of class; gives synonyms or antonyms for vocabularly words; counts aloud to 100 in front of teacher; recalls aloud multiplication facts (6 x 1 = 6, 6 x 2 = 12, 6 x 3 = 18...); given a word says a sentence with that word; given a state, names the capital; makes the phonetic sound when presented with consonant blends (th, sh, st, cr,...); recalls part of a story just read. In recitation there is a clearly right or correct oral response (close-ended) expected of TS by the instructor.

(4) Listening: TS is required to listen to someone or something present information orally (e.g., lecture, movie, a story being read aloud and TS does not visually follow the text).

(5) Discussing: There is verbal exchange (conversation) between TS and others, and it is mostly open-ended. TS may ask questions, make comments, express opinions, express pro's and con's about subject under consideration and/or answer open-ended questions (usually no right or correct answer). If TS does not participate in the discussion at all but just listens, code listening not discussing.

(6) Writing: TS writes by print or cursive letters or writes numbers. Do not include drawing. E.g., copying spelling words, doing math worksheet by writing answers to problems, writing a composition, writing fill-in-the-blank vocabulary exercise, tracing letters with pencil.

(7) Other: TS is engaged in some other activity not listed above, e.g., free hand drawing, cut and paste, dancing, singing, playing soccer, etc. Specify the predominant "other" activity in the blank.

What if more than one TS activity is about equally predominant? Multiple codes can be used here if there is more than one specific TS activity that occurs about equally often, e.g., TS silently reads workbook questions about a story and writes down the answers in the workbook. This would be coded 2 | 6 .

2.7. Task Difficulty for TS

The difficulty level of a task for the target student, easy, medium or hard, must be coded for all reading and mathematics events. Difficulty is coded to indicate the cognitive demands of the reading or mathematics task for the individual student.

Easy represents work on existing knowledge or skills of the student. Time at this level may serve as useful reinforcement of existing skills. It includes review and practice. Few errors are made and little effort is required of the student.

Medium difficulty is the middle range between easy and hard, representing those activities that are generally challenging for a target student, involving some unacquired and some existing knowledge or skills of the student.

Hard is a category consisting of tasks that the target student cannot perform beyond a chance level of correct responses. That is, the student shows essentially no understanding of the task.

The primary basis for determining the difficulty level of a task for a target student is the error rate of that student for the kind of problems included in that task. However, in addition to error rate, the speed with which a student works will sometimes be used to differentiate the easy and medium difficulty categories. The easy category is characterized by a very low error rate, where the student appears to be responding with virtually no errors, except what you might expect by chance (careless errors). The hard category is characterized by an extremely high error rate, where the student appears to show virtually no correct responses, except what you would expect by chance (luck). The medium category includes the range between easy and hard. The additional consideration of the speed with which the student works through the problems enters in when virtually no errors are observed, but the student is working at a noticeably slower than average pace. If such an unusually slow but errorless response rate is not simply a function of a low level of engagement, but in fact appears to be the result of the difficulty of the task for that student, then medium would be coded rather than easy.

The observer should take into account the speed with which the student completes a task only when the student is obviously much slower than the average student in that classroom working on that task. For example, if the target student has spent 30 minutes on the first three problems of a 20 problem computation worksheet, while most of the class completed the entire worksheet in less than 30 minutes, then medium would be coded even if the target student has answered those first three problems with no errors.

Difficulty level is not coded on a problem-by-problem basis. All of the problems within the related set receive the same difficulty code, according to the student's performance on the set as a whole.

It should be noted that difficulty is always coded for the academic task that determines the content code for a given event. Therefore, when the student is listening to the teacher give directions or task engagement feedback, the coding of difficulty does not relate to those directions or that feedback per se. Rather, it relates to the content of the academic task to which the directions or task engagement feedback apply.

Accurate coding of difficulty level will obviously be, itself, an extremely difficult task in some cases. Nevertheless, the difficulty level of reading and mathematics content must always be coded, even when the student was not engaged in the task for which difficulty is coded. Where little information is available for the determination of difficulty level, the observer must make his/her best judgment at the time.

The judgement of difficulty level must be made on the basis of overt responses by the target student in relationship to the task under observation. Therefore, the coding of difficulty will be less reliable when few or no overt responses are observable. However, it will be possible to isolate, for the purposes of data analysis, those events for which there may have been few or no observable overt responses. These events will be characterized by the learner moves coded with them,* indicating that the student's engaged response was covert or that the student was not engaged. Therefore, it will be possible to analyze the extent to which the availability of overt student responses is related to the reliability with which difficulty level can be coded.

It should be noted, however, that the observer can often judge difficulty on the basis of overt responses even when no overt response occurs within the particular activity being coded. Previously observed overt responses for the same kind of problems can be used to determine difficulty. In addition, the observer can simply ask the target student to perform a problem overtly (read aloud, compute a mathematics problem, etc.). Often it is possible to ask a student to do a problem during the ongoing observation. In other cases, the observer may prefer to wait until a recess or lunch period, ask the student to perform a problem, and retrospectively code the difficulty level for previous activity.

Several specific situations warrant consideration to clarify the application of the procedures described above. First of all, the error rate used to judge difficulty must be evaluated in terms of the probability that a student can guess the answer to a problem without understanding it. This will depend a great deal upon the kind of problem performed by the student. For example, if the student is writing complete sentence answers to reading comprehension questions, then there is very little possibility of his/her correctly guessing the answer. However, if the student is responding to true-false questions for reading comprehension, then there is a fifty percent probability of his/her correctly guessing the answer.

Error rates and the probability of guessing correctly are not as readily applicable to oral reading as they are to other activities. This is because there are many opportunities for errors, and little apparent chance for guessing (decoding and comprehension skills would have to be applied in order to guess). Furthermore, the passage to be read may be a combination of extremely easy and extremely difficult words. For the purpose of enhancing the reliability of coding between observers, a simple rule will be used here. If the student is unable to read only one word (or none) per paragraph, then the passage will be coded as easy for that student. If the student is generally unable to read at least two but no more than eighty percent of the words in each paragraph, the the passage will be coded as medium for that student. If the student is unable to read more than eighty percent of the words per paragraph, then the passage will be coded as hard for that student. "Unable to read" would apply to words that the student cannot read properly without prompting. This should not include careless errors. If it appears that a student has misread a word only because of a careless error, then that error should not be included in the determination of error rate.

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*Learner moves are coded on the Real-Time Coding Sheet.

The context within which problems are performed may affect the error rate for those problems. For example, a given student might be able to perform certain computation problems with virtually no errors when working alone at his/her seat. The same student, however, might be so distracted when working at the board in the front of the class that he/she shows a high error rate, possibly even being unable to answer the problems at all. Those problems for that student would therefore be coded at different difficulty levels depending upon whether the student is working at his seat or at the board. Hence, the context within which the problems are performed is considered to be part of the problems themselves, for the purpose of coding difficulty.

2.8. TS Instructor: Who or what is doing the instructing (providing information, soliciting TS responses, giving feedback)?

(1) Teacher: The person formally in charge of the classroom is instructing TS.

(2) Peer (tutor): Another student is instructing TS.

(3) Aide (adult): Some adult person other than the teacher is instructing TS (e.g., student teacher, parent volunteer).

(4) Self-instructional materials: The information and feedback are part of the materials for instructing TS--e.g., special workbooks where the correct answer shows a special color when marked; a non-branching filmstrip with cassette audiotape which solicits TS responses and provides feedback; an instructional game (excluding teacher participation); a puzzle, where the feedback comes from finding the correct solution. The materials themselves are non-adaptive to TS responses, but do provide feedback to TS responses.

(5) Teaching Machine/Tutor: The information and feedback are presented through a mechanism which is adaptive to the TS--e.g., an interactive computer program which presents information and gives feedback depending on how TS responds to task; a simulation/game on a computer where computer adapts/competes with TS based on his/her responses.

(6) No instructor: All of the above means of instruction include a way to monitor directly how well the TS is doing at the time the TS is engaged in the activity and have the capacity to provide feedback or correction immediately (during the activity). If this condition is not met, then there is no instructor, e.g., TS is doing a worksheet independently and does not get any immediate feedback during the task; TS is silently reading and answering questions in a workbook and cannot tell for sure whether his answers are correct.

2.9. Describe the major task(s) that the instructor does with TS in this activity: In your own words list the major behaviors in which the teacher engages with the TS during this activity. Be specific. For example, in an oral reading lesson: Instructor calls on children to read in a random manner (TS never knows when will be called on), lets TS try to correct own mistakes first, and if necessary gives hints instead of telling TS the correct word; only tells correct word if TS has tried and failed several times. About every 2-3 paragraphs, instructor asks a question to the whole group about what was just read, and calls on TS twice. Another example, in math seatwork: T. passes our worksheet, gives directions, demonstrates to group how to do the first two problems, and then works at desk generally supervising the seatwork. At least 5 times TS brings worksheet to T's desk for help and T probes and prompts TS on the part TS was stuck on.

Note: There is no need to describe T. tasks with children other than TS, unless the T. behaviors are directed to the students in the group of which TS is a member.

2.10. Predominant Instructor Activity with TS: Try to determine which of the following was the predominant specific instructor activity with the TS. Do not be concerned with teacher activities with students other than TS, unless they are directed to the group of which TS is a member.

(1) Lecturing: This includes telling, explaining, informing, reviewing, reading to TS about something, etc. TS is primarily expected to listen. Do not code lecturing if instructor is demonstrating or modeling how to do something and is explaining during the demonstration. This would be coded as modeling/demonstration (see below).

(2) Discussing: There is verbal interchange between instructor and TS (or group including TS); it is mostly open-ended (usually no right or wrong answers). Instructor may ask questions, make comments, express opinions, express pro's and con's about subject under consideration, and/or answer questions asked.

(3) Prompting: The instructor asks questions, solicits TS responses, gives hints/cues and/or reminders, gives feedback/correctives/reinforcement to TS when there is a clearly right or correct TS response expected. Instructor may also give a brief explanation or demonstration based on TS difficulties in responding, e.g.:

- T gives spelling word, calls on random student, listens to him/her spell, gives hint if not correct, acknowledges correct spelling;
- T watches TS do a fractions problem at board, asks him what he is doing at each step, corrects if necessary;
- Vocabulary drill--instructor shows card, TS says word, instructor indicates if right or wrong, or tells word if TS is stuck;
- Oral reading--instructor listens to TS read, prompts if TS makes a mistake or is stuck, encourages TS to read (positive reinforcement), asks comprehension questions occasionally.

(4) Modeling/Demonstrating: The instructor shows TS (or group of TS) how to do something. Usually this is planned ahead of time (i.e., not based on immediate questions or difficulties S may be having with task), e.g.:

- T at blackboard and shows how to do long division problem, how to diagram sentence;
- T shows how to cut out a snowflake;
- Movie narration and pictures show how to safely handle chemicals and what happens if careless;
- T performs a science experiment on Boyle's law for S's to watch.
- T takes a turn reading aloud during oral reading.

(5) Testing: Instructor is formally assessing TS (or group with TS) and S's are aware that it is a test and that some kind of a score, rating, or grade will be assigned based on each S's performance.

(6) Supervising: The instructor is not directly interacting with or instructing TS (or the group with TS), but is instead overseeing student task engagement. The instructor does not communicate directly with S's most of the time, although may occasionally answer questions or make comments about student work, e.g.:

- T sitting at desk, grading papers and watching class;
- T walks around class and looks at students' work to see how its going, occasionally making remarks to some students.

(7) Other: The instructor is engaged in some activity not described above. Specify examples in the blank. Examples:

- T is out of room during current activity;
- T spends most of time on discipline (behavior management) problems during current activity.

Note: If two or more specific teaching activities occur about equally during the time period, then enter multiple codes--e.g., modeling and prompting and supervising would be coded: | 4 | 3 | 6 | .

2.11. Reading Content Categories Summary

Category #	Category Name	
10.	DECODING/PHONICS -single consonants -consonant blends and digraphs -variant consonants (c or g) -short vowels -long vowels -other decoding	*EXAMPLES*
11.	WORD STRUCTURE -compound words -root words and affixes -syllables	
12.	WORD MEANING -synonyms -pronoun reference -other word meaning	
13.	COMPREHENSION -verbatim (no rephrasing) -translation (paraphrase) -inference/synthesis -identifying main ideas -evaluation of fact and opinion -other comprehension	
14.	READING PRACTICE -sight words (general practice at reading single words) -oral reading of text -silent reading of text -reading in content areas -listening while reading	
15.	READING RELATED - SPELLING	
16.	READING RELATED - GRAMMAR	

17. READING RELATED - COMPOSITION/CREATIVE WRITING

18. READING RELATED - OTHER

19. READING BELOW TEST LEVEL

Reading Content Category

Definitions

10. DECODING/PHONICS -- learning letter-sound correspondences

A number of different tasks can be used in exercises aimed at teaching decoding; for example:

a. The child could be asked to give the sound associated with a particular letter or group of letters.

b. The child could be asked to read words with a common sound or with a rhyming pattern.

c. The child could be asked to recognize or identify a word containing a particular sound.

d. The child could be asked to write words with a particular sound. (Spelling or dictation are decoding tasks when they focus on a particular spelling pattern.)

e. The child could be asked to match words containing the same sound.

f. The child could be asked to locate all the words in a list or story which have a particular sound or spelling pattern.

g. Even fill-in-the blank exercise can be decoding, if the choice the student must make depends on and teaches accurate decoding.

For example:

Mary put the ____________ around the package.

sting
bring
string

What these tasks (and others not listed) have in common is that they pair particular letters or groups of letters with particular sounds and they teach students to make the association.

Note: Sometimes, particularly in some basal reader programs, students will read single words where the lesson does not focus on a particular spelling-sound correspondence. This would be coded as reading practice (#14)--sight words. See that category for further discussion.

10.1. Single Consonants

Single consonants located in any position in a syllable or word.

Examples: /t/ in tan, bat, ate

10.2. Consonant Blends and Digraphs

Common combinations of consonants, located in any position in a syllable or word.

Examples: Blends include st, tr, fl, cr, sp, spr, thr, nd, etc. as in flower, spread, sand

Digraphs include sh, ch, th, wh as in where, thin, wash.

10.3. Variant Consonants (c or g)

Most consonants have one dominant letter-sound correspondence. Some consonants are variable; they have 2 common patterns.

Examples: cat vs. city; goat vs. gentle

Tasks: To fall in this category, teaching tasks should compare and contrast the two decodings of the same letter. The student might have to decide which sound was appropriate in a particular word, or with a particular vowel following the consonant (ca vs. ci).

10.4. Short Vowels

Regular short vowel sounds of a, e, i, o, u.

Examples: bat, red, sick, pond, fun

10.5. Long Vowels

Regular long vowel sounds of a, e, i, o, u.
Two major types of spelling patterns produce these sounds - final e and digraphs.

Examples:
bake; rain
these; mean, feet
fine
pole; boat
huge

10.6. Other Decoding

Besides the basic categories above, other specific decoding patterns might be taught.

Examples: Complex vowel combinations such as dipthongs (oi, ou, oo, aw, etc.)
Sounds of "y" as a vowel (as in cry, candy)
Effects of consonant context on vowel decoding (vowels followed by "r" as in cart or fair; vowels followed by "l", as in tall)
Silent consonants (know, ghost)
Etc.

11.0 WORD STRUCTURE -- analysis and meaning of word parts

11.1 Compound Words

Two meaningful words are combined to form a new word, which takes its meaning from the parts.

Examples: mailbox, goldfish

Tasks: Students might be asked to identify the parts, combine parts to create new words, or identify words which are compounds.

11.2 Root Words and Affixes

Prefixes and/or suffixes added to a root word

Examples: suffixes like -ly, -ful, -less, -able, -er, -est, -tion, etc.

prefixes like un-, re-, mis-, trans-, pre-, ex-, in-, etc.

grammatical endings like -s, -ed, -ing

(Includes spelling changes like doubling the consonant, dropping the final e, or changing y to i. Also includes irregular forms like go, goes, went, gone, going.)

Tasks: Students might have to identify root words, identify affixes in words, or add affixes to words. Includes work on the meaning of affixes and on the correct use of word forms in sentences (John is _______________ up the street.)
walk
walked
walking

The student might have to decide which prefix or suffix was needed to create a particular meaning, or the student might have to figure out the meaning of a word from the meaning of the parts.

11.3. Syllables

Conventional or sound-based units rather than meaningful units.

Examples: demonstration = dem on stra' tion (4 syllables)

Tasks: Students might have to identify the first or last syllable in a word, or break a word into syllables, or determine the number of syllables in a word. Included work on locating the accent or stress in a word.

12.0. WORD MEANING -- Understanding the meaning of a specific word or phrase

12.1. Synonyms

Two words which mean about the same thing.

Examples:
vibrating ship = shaking ship
discover a cave = find a cave
little = small
everyone = all

Tasks: Students might be asked to name a word that means the same thing as another word. Or students might be asked to match words that are synonyms.

12.2 Pronoun reference

The meaning of a pronoun comes from the noun to which it refers.

Examples: Lisa tried to open the window.
It was stuck.
(What does "it" mean? window)

Tasks: The student might be asked to identify the noun a pronoun refers to (as above). Or the student might be asked to fill in the appropriate pronoun for an incomplete sentence.

(John handed the teacher ____________ homework paper.)
her
his
its

12.3. Other word meaning

Meanings of words alone or in the context of a sentence

Examples: Definitions, including using dictionary entries to define words

Defining words from context (using the meaning of a sentence to figure out the meaning of an unfamiliar word or a word with multiple meanings)

John used the term "habeas corpus" in his speech about law.

term means

A. a period of time
B. an assigned time to serve
C. a word with an exact meaning
D. a condition or requirement

Using words in sentences (writing a sentence that shows the meaning of a new vocabulary word)

Antonyms (words opposite in meaning)

Figurative Language (recognizing the meaning of a word or phrase used in a nonliteral sense, including simile, metaphor, and idiomatic expressions)

"John laughed his head off."
means "John laughed a lot."

Crossword Puzzles

Classification of words (apples, oranges, and peaches are fruit).

Tasks: The student might be asked to give the meaning of a word, match a word with its definition, or write a sentence using a particular word.

13.0 COMPREHENSION - Understanding of ideas expressed in written material, including understanding of literature and understanding of written material in the content areas (science and social studies)

The story below will be referred to in the examples of the comprehension categories. Time spent reading the story would be coded in Reading Practice. Time spent answering questions, writing about, or discussing the story would be coded in Comprehension.

SAVING THE SEALS

Who owns the sea? The ships of all countries sail the open seas. Not long ago, all countries could fish and hunt in the ocean as they pleased. Now, the countries using the sea must work together to protect the sea's animal life.

In 1870, there were millions of valuable fur seals in the Bering Sea. Ships came from all parts of the world to kill them. Men wanted the animals' fur and the oil from their bodies. By 1910, only about 130,000 seals were left. Even the hunters knew that something had to be done or the seals would disappear.

Four countries owned land near the seals' northern home. In 1911, these countries began plans to control seal-hunting. The governments of Japan, Russia, Canada, and the United States agreed to kill no more seals in the open seas. Because they wanted to protect mother seals and their young, they agreed that only male seals without mates could be killed. Money earned from the skins and oil of these seals was to be divided among the four governments.

Today, large heards of seals swim in the Bering Sea again. By working together, four countries saved the seals in the sea they share.

13.1. Verbatim (no rephrasing)

Understanding and recall of information exactly as stated in the text.

Examples:
1. Where do large herds of seals swim today? (in the Bering Sea)
2. Which governments agreed to kill no more seals in the open sea? (Japan, Russia, Canada, U.S.)
3. Why did they agree that only male seals without mates could be killed? (to protect mother seals and their young)

13.2 Translation (paraphrase)

Recognizing ideas stated in different words; recall of information when ideas are restated; rephrasing of ideas in other words.

Examples:
1. Which countries joined in the agreement to limit seal killing? (Japan, Russia, Canada, U.S.)
2. Describe in your own words what the countries agreed to do.

13.3 Inference/Synthesis

Synthesis of information from different points in a text; understanding of ideas implied by a text; using background knowledge or experience to interpret or extend the ideas in a text; drawing conclusions or predicting outcomes.

Examples:
1. Why were the seals hunted?
    - a. People wanted to eat seal meat.
    - b. Their fur and oil were valuable.
    - c. The seals were eating all the fish.
2. The story does not say so, but it makes you think that
    - a. hunters used seal oil on their bodies
    - b. seals have little value for hunters
    - c. all the seals might have been killed
3. What would happen if only 2 of the 4 countries joined the agreement?

13.4 Identifying main ideas

Recognizing the topic of a passage; identifying and understanding the central or most important ideas being communicated.

Examples:
1. On the whole, this story is about
   a. Russia and Canada
   b. protecting seals
   c. hunting in the Bering Sea

2. What message is the author trying to get across? (It is important to protect animals. Countries need to work together.)

Besides answering questions, this content category includes work on outlining a passage, or recognizing the structure and organization of a passage (superordinate and subordinate elements).

13.5 Evaluation of fact and opinion

Critical analysis of statements and the basis for their acceptance; identifying fact and opinion statements. Also includes evaluation of the qualifications of a speaker/writer and understanding how "loaded" words convey opinions.

Examples: Which statement is a fact rather than an opinion?

a. Seals should be protected.
b. All the seals very nearly died.
c. In 1910, only about 130,000 seals were left.

13.6 Other comprehension

Comprehension of written material which does not fit one of the specific categories above. Also includes situations where a comprehension activity mixes several types of comprehension so thoroughly that it would be impossible to separate the time.

Examples: Following directions

Application of reading skills to real-world materials like signs, menus, TV schedules, etc.

14.0. READING PRACTICE - Practice in reading

Note: All reading activities involve the act of reading. Use the Reading Practice category only for activities where students spend time just reading. We will automatically assume that time in specific skills (decoding, word structure, word meaning, or comprehension) includes some reading practice as well.

14.1. Sight words

General practice at reading single words. No particular decoding focus. Students must integrate a variety of decoding skills in order to read a word on sight.

Tasks: Students read these words at the beginning of a lesson:

slippers bought hurry etc.

Teacher reads a word and the students must circle it:

[✓ watch] was what
liver lives [✓ silver]

Any word reading task where there is no intent to practice specific decoding patterns.

14.2. Oral reading of text

Individual or choral reading of stories by students.

Tasks: Reading circle where students take turns reading aloud from a story.

14.3. Silent reading of text

The student reads a story to himself.

Tasks: Students have time for independent reading. Each student reads to himself. Students might go to the library and read. A student might read when he finishes other work early.

14.4. Reading in content areas

Reading science or social studies material (oral or silent)

Tasks: The student reads silently in the social studies book. The students take turns reading aloud from the Weekly Reader.

14.5. Listening while reading

The student listens while he reads in an accompanying text.

Tasks: The student must be simultaneously reading and listening. He could be listening to a tape or record of a story and reading along. Includes music if the student is both reading and singing.

15.0. READING RELATED -- SPELLING -- matching word sounds with particular configurations of letters

Tasks: The teacher might read a word or sentence and have the students write it. Students might have to decide whether or not a word is spelled correctly. Includes work on homonyms (like "to", "too", "two", or "peace", "piece") and their correct use in sentences. Some lessons may focus on particular patterns in letter-sound correspondence (like sounds of the letter "y", or words with silent "e").

16.0. READING RELATED -- GRAMMAR -- understanding sentence structure and grammatical form.

Examples: Capitalization, punctuation, parts of speech, diagramming sentences

Tasks: Many possible activities involving grammatical concepts.

17.0. READING RELATED -- CREATIVE WRITING -- students make up their own stories and write them.

Tasks: The teacher might have all students write a story about summer vacation. Or students might write their own endings to a story they have been reading.

18.0. READING RELATED -- OTHER

18.1. Study skills

Learning and using skills that help the student acquire knowledge through reading.

Examples: Dictionary skills, alphabetization, table of contents, using the index, using the encyclopedia, card catalog, finding books in the library.

18.2. Other

Other activities which are related to reading.

Examples: Foreign language.

Reading maps or graphs.

19.0. READING BELOW TEST LEVEL -- copying or imitating

Examples: Copying, where the student directly copies letters, words or sentences. Includes penmanship.

CONTEXT CLUES -- A COMMON FORMAT

A common response format in workbook pages, especially in earlier grades, is to ask the student to fill in the blank to complete a sentence. To perform the task the student must read the sentence parts that are given and understand their meaning in order to recognize the element that would complete the thought. He must use the context as a set of clues which define the nature of the missing piece. Understanding the sentence framework is a comprehension process. But the task also involves selecting the best word(s) to fill the blank, and the nature of the choices is critical. To code the content of items in a context clues format, consider the distinctions the child must make in order to select the correct alternative.

The examples below show some of the different ways a context clues format can be used:

Decoding:

Jane ate a red candy ___________.
cane/can

Here the student must not only understand the sentence but also know the role of final e in decoding vowels. Without this knowledge of decoding patterns, the child might know the word he wants to fill the blank but still select the wrong alternative. The purpose of the exercise is to practice decoding rules.

Word Structure:

Tim went ________ down the street
skip
skips
skipping

This exercise teaches correct use of grammatical endings.

Word Meaning:

Susan ran to her house. Then _______ went inside.
she
he
it

This requires pronoun reference.

Some animals have snouts. They are really long ___________.
ears
mouths
noses

Because the ocean roars, we need to ________ to be heard.
talk
shout
whisper

In the two examples above, the emphasis is on the meaning of the missing word. The student must consider the semantic distinctions among the choices in order to select the word with the best meaning to complete the sentence.

Choose from these words to complete the sentence below:

lazy dozing buzzed dizzy grazing

Soon, a bee ____________ around the colt's head.

In this example the word choices all have the letter "z". But this decoding element is a constant factor; students don't have to focus on the decoding in order to complete the sentence. Sentence completion focuses on selecting the word with the best meaning. (Note: Time spent reading the word choices and talking about the sound of the letter "z" in these words would be coded as Decoding.

Comprehension:

After reading the story of the Little Red Hen, the student must complete this sentence:

The fox lived in a house made of ________________.
straw
wood
stones

The purpose of questions like this is to check story comprehension; the correct answer depends on having read the story. This question assesses understanding of event data (verbatim).

2.12. Math Content Category Summary

20. ADDITION/SUBTRACTION (NO REGROUPING)

    - standard short form
    - basic facts
    - speed tests

21. ADDITION/SUBTRACTION (WITH REGROUPING)

    - standard short form
    - basic facts
    - speed tests

22. COMPUTATIONAL TRANSFER (Properties, # patterns, missing addends, number sentences with inequalities)

23. PLACE VALUE/NUMERALS (whole numbers)

24. MULTIPLICATION

    - basic facts
    - speed test
    - multiplication algorithm

25. DIVISION

    - basic facts
    - speed test
    - division algorithm

26. FRACTIONS/DECIMALS

27. SPATIAL APPLICATION

    - linear measurement
    - geometry (perimeter, area, # pairs, lines/figures)

28. VERBAL APPLICATION

    - word problems

29. MATH RELATED

30. MATH BELOW TEST LEVEL

Math Content Category Definitions

20. ADDITION/SUBTRACTION--NO REGROUPING

Learning the basic addition and subtraction facts. Finding the sum or difference of problems which do not require the renaming of 10 ones as 1 ten or 1 ten as 10 ones (i.e., no "carrying" or "borrowing").

20.1 Basic facts: Basic addition facts are the sums of two single digit addends up through 9 + 9. The basic subtraction facts are the inverses of the addition facts and therefore include facts up through 18-9.

20.2 Non-regrouping problems in addition: Sums of a single digit and a multiple digit addend or two or more multiple digit addends which do not require the renaming of 10 ones as 1 ten.

$$\begin{array}{r} 10 \\ \underline{+\ 5} \end{array} \qquad \begin{array}{r} 23 \\ \underline{+\ 46} \end{array} \qquad \begin{array}{r} 547 \\ \underline{+\ 201} \end{array}$$

Includes column addition without regrouping.

$$\begin{array}{r} 6 \\ 4 \\ \underline{+\ 5} \end{array} \qquad \begin{array}{r} 20 \\ 30 \\ \underline{+\ 10} \end{array} \qquad \begin{array}{r} 21 \\ 13 \\ \underline{+\ 15} \end{array}$$

20.3 Non-regrouping problmes in subtraction: Finding the difference between a single digit and a multiple digit number or the difference between two multiple digit numbers which do not require the renaming of 1 ten as 10 ones.

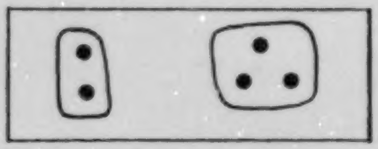
$$\begin{array}{r} 27 \\ \underline{-\ 7} \end{array} \qquad \begin{array}{r} 28 \\ \underline{-\ 14} \end{array} \qquad \begin{array}{r} 532 \\ \underline{-\ 420} \end{array}$$

Note: Problems in this category can be presented in a variety of formats.

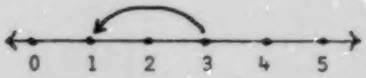
The problem may be laid out horizontally or vertically:

$$\begin{array}{r} 2 \\ \underline{+\ 3} \end{array} \qquad \begin{array}{r} 3 \\ \underline{-\ 2} \end{array} \qquad 2 + 3 = \underline{\quad} \qquad 3 - 2 = \underline{\quad}$$

Pictoral representation may be used to help the students understand the basic processes of joining or separating sets and/or as an aid in carrying out the computation involved:



$2 + 3 = \square$



$3 - 2 = \square$

In all of the examples above, the primary task is to find the sum or difference between two numbers when both of those numbers as well as the applicable operational sign are given.

However, there are situations where instructional algorithms or processes involving place value concepts are used in the teaching of these same computational skills and when this occurs the instruction should be coded under category #23.

There are other situations which require more than the straight-forward computation of a sum of difference (but do not involve place value) and these situations are discussed in the Computational Transfer Section (# 22).

21. ADDITION/SUBTRACTION--REGROUPING

Addition problems which require the renaming of 10 ones as 1 ten ("carrying") and subtraction problems which require the renaming of 1 ten as 10 ones ("borrowing"). Here we want to include only the regrouping problems which are presented in the standard computational algorithmic format, also known as the short form.

$$27 + 3 = \_\_\_ \qquad \begin{array}{r} 18 \\ +\ 14 \\ \hline 32 \end{array} \qquad \begin{array}{r} 13 \\ 15 \\ +\ 16 \\ \hline 44 \end{array} \qquad \begin{array}{r} 26 \\ -\ 9 \\ \hline 17 \end{array} \qquad \begin{array}{r} 40 \\ -\ 15 \\ \hline 25 \end{array}$$

This category is parallel to category 20 in that the student is given two numbers and told to find their sum or difference but in this case the problems also require regrouping. The general guidelines on format in category #20 also apply to this category.

22. COMPUTATIONAL TRANSFER

Tasks which require the student to recognize and apply some of the operational concepts and patterns within our number system. The student must understand and use the operations which underlie computation, but in a format which involves more than straight-forward computation. Includes:

22.1 Properties:

1. Commutative property of addition and multiplication.

$$3 + 2 = 2 + 3$$

$$2 \times 3 = 3 \times 2$$

2. Associative (grouping) property of addition.

$$2 + (3+5) = (2+3) + 5$$

3. Properties of zero.

   Identity element of addition: $18 + 0 = 18$

4. Distributive property.

$$2 \times (3+2) = (2\times3) + (2\times2)$$

$$(12+6) \div 3 = (12\div3) + (6\div3)$$

22.2 Number Patterns: Tasks which promote the student's search for and recognition of the various patterns which can be found among numbers.

Examples:

1. Counting by 2's (odd and even numbers).
2. Counting by 5's, 10's, 20's, etc.
3. Functions - discovering or applying a function rule like add 3, subtract 2, etc.

a. Rule is given: Add 4 to each number in top row:

0	2	5	7	9
4	6			

b. Student must discover and apply the rule to complete the pattern.

1	3	8	4
4	6	11	?

7, 5, 3, ?

{ (1,2), (2,4), (3,6), (4,?) }

22.3 Missing Addends - Open Sentences: Number sentences in which the sum or difference is given and one of the addends or numbers is unknown.

Examples:

$$\begin{array}{r} \square \\ \underline{+\ 3} \\ 7 \end{array} \qquad \begin{array}{r} 4 \\ \underline{+\ \square} \\ 7 \end{array} \qquad \begin{array}{l} \square - 5 = 5 \\ 5 - \square = 2 \end{array}$$

$$\begin{array}{r} \square \\ \underline{-\ 3} \\ 4 \end{array} \qquad \begin{array}{r} 7 \\ \underline{-\ \square} \\ 3 \end{array} \qquad \begin{array}{l} \square + 6 = 10 \\ 4 + \square = 10 \end{array}$$

22.4 Number Sentences with Equalities and Inequalities - Includes only those number sentences that involve computation plus the use of >, <, =, +, -.

$$\begin{array}{rl} 7 - 6 \;\textcircled{<}\; 1 + 3 & \\ 7 \;\textcircled{>}\; 4 - 3 & \qquad 7 \;\overset{-}{\triangle}\; 2 = 5 \\ 10 - 10 \;\textcircled{=}\; 15 + 5 & \qquad 8 \;\overset{+}{\triangle}\; 3 = 11 \end{array}$$

This category does not include the use of inequality signs in numerical comparisons. i.e.,

$$\left.\begin{array}{r} 27 \;\textcircled{>}\; 26 \\ 127 \;\textcircled{>}\; 126 \end{array}\right\} \text{ This should be coded as \#23 (place value/numerals)}$$

22.5 Factors and Multiples: The study of common and least common multiples, common factors, sets of factors, prime numbers, and prime factorization.

Examples:

1. $6 \times \square = 42$ 2. $12 = 2 \times 2 \times 3$

3. Name the multiples of 2, less than 20.

23. PLACE VALUE/NUMERALS

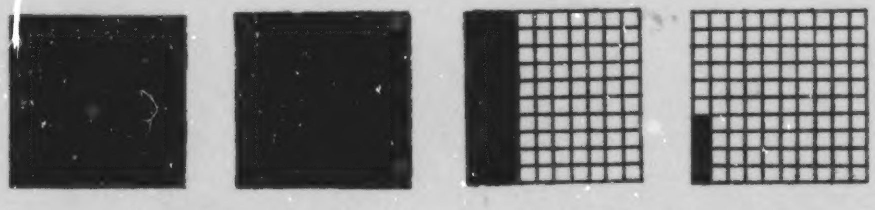
23.1 Place Value/Numerals - Place value involves the concept that a digit has three meanings. It's face value (the meaning it has wherever it is used), it's place value (the meaning it takes from it's place in a numeral), and it's total value (which is the product of the first two values). In the numeral 45, the 4 has a face value of four, a place value of ten, and a total value of forty. Teaching place value will involve expanded and compact notation, identification of the one's, ten's, or hundred's place, and naming the number of tens (or ones, etc.) in a numeral.

Numerals includes understanding the order of the counting numbers and evaluating the sequential position of one numeral in relation to another. Comparing and evaluating numerals will involve place value concepts.

Examples:

A. Place Value:

1. How many tens in 75?
2. Which number is in the one's place?
3. 6 tens and 2 ones = 60 + 2 = 62
4. 155 = 100 + 50 + 5
5. Use of manipulatives or pictures to teach numerical structures.



2 hundreds, 3 tens, and 4

We write 234

B. Numerals

1. Writing the missing numerals.

46			49	

2. What number comes before, after, or between?
3. Using inequalities: 145 > 135.
4. Practice in reading numerals up through millions.
5. Understanding the use of commas to set off the periods (e.g., 1,575,231).

23.2 **Addition/Subtraction With or Without Regrouping - Instructional Algorithms With Place Value Transformations:**

In our base 10 number system the understanding of place value is essential to the learning of computational skills. With this in mind, curriculum materials often include instructional algorithms or processes which combine place value concepts along with practice in computation. These processes may involve expanded notation or the designation of tens and ones. Some common (depending on text) instructional algorithms are:

$$\begin{array}{rcl} 14 & = & 10 + 4 \\ \underline{+\ 14} & = & \underline{10 + 4} \\ & & 20 + 8 = 28 \end{array}$$

(Use of Expanded Notation)

$$\begin{array}{rccc} & & \text{Tens} & \text{Ones} \\ 16 & = & 1 & 6 \\ +\ 14 & = & 1 & 4 \\ \hline & & 3 & 0 \end{array}$$

(Designation of ten's and one's place)

$$\begin{array}{r} 14 \\ +\ 14 \\ \hline 8 \\ 20 \\ \hline 28 \end{array}$$

(Long form with partial addends)

24. MULTIPLICATION

24.1 **Multiplication - Basic Facts:** Multiplication with two 1-digit factors. Also known as times table up through 9 x 9.

24.2 **Multiplication - Speed Tests:** Timed tests in the basic multiplication facts. May also include speeded flash card drill which is specifically aimed at increasing automaticity.

24.3 **Multiplication Algorithm:** Multiplication with one factor of two or more digits, i.e., all multiplication above the basic facts.

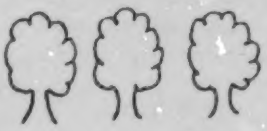
25. DIVISION

25.1 **Division:** Division of whole numbers. All levels of difficulty. Includes speed tests in division.

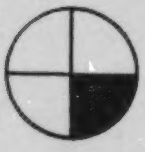
26. FRACTIONS/DECIMALS

26.1 Fractions - Recognizing and identifying a fractional part of a set, region, or line:

Examples:

a. 

Draw a ring around 1/3 of the trees.

b. 

What part of this region is shaded?

26.2 Fractions: Computation with fractions including the recognition and identification of equivalent fractions.

26.3 Fractions: Converting decimals into fractions (e.g., .625 = 5/8)

26.4 Decimals: Place value ($\frac{1}{100} = .01$, $.5 > .25$); arithemtic operations with decimals (+, -, x, ÷).

27. SPATIAL APPLICATION

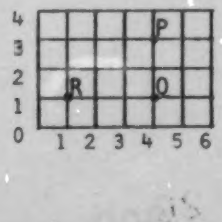
27.1 Linear Measurement - Measuring the length, width, or height of objects, lines, or pictures.

27.2 Geometry - Perimeter: Computing the perimeter of a polygon using standard or arbitrary units of measure.

27.3 Geometry - Area: Computing the area of a polygon using standard or arbitrary units of measure.

27.4 Geometry - Number Pairs: Identifying number pairs on a number plane.

Example:



What is the number pair for point Q?

27.5 Geometry - Lines or Figures:

Recognizing and identifying common lines and plane figures. Includes angles, parallel and perpendicular lines, parallelograms, rectangles, squares, and right triangles. Does not include work with solid figures like spheres, rectangular prisms, etc.

28. VERBAL APPLICATION

28.1 Word Problems: All types of word problems including word problems with graphs. The coding of word problems is given priority over the specific computation required by the problems. Therefore, regardless of the computation, time on word problems is coded under word problems.

29. MATH RELATED

29.1 Money - Identifying coins, the sum of a set of coins, and equivalent values of coins. Using coins for practice in addition, subtraction, and understanding the decimal system.

29.2 Other Concepts: Other concepts and applications not covered by codes 20 through 28.

Examples:

Volume
Solid Figures
Liquid or Weight Measures
Statistics and Probability
Constructing Line and Bar Graphs
Set Theory, Set Diagrams, Logic
Place Value with Decimals
Exponents (concepts of)
Averages (concepts of)

30. MATH BELOW TEST LEVEL

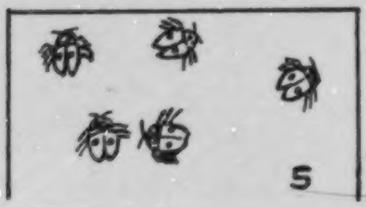
30.1 Developmental Activities - Activities which do not involve computation but do promote the development of concepts which are considered preliminary to the understanding and use of operational concepts. Includes:

A. Review of basic number concepts such as learning the number name for a set of objects less than 10, learning to count and write the numbers from 0 to 10, one to one matching and recognition of equivalent sets.

Examples:

three	▯ ▽ ○	3 3 3 3

How many?



B. Activities which provide experiences (most often with concrete materials) in recognizing likenesses and differences, sorting, ordering, comparing, and matching.

Examples:
Attribute blocks or games
Pattern blocks
Tangrams
Geoboards
Geoblocks
Soma cube puzzle

2.13. Content Summary: Other Academic

40. PHYSICAL/BIOLOGICAL SCIENCES
    - Biology
    - Physics
    - Chemistry

41. SOCIAL SCIENCES
    - Geography
    - History
    - Social Studies
    - Current Events

42. FOREIGN LANGUAGE
    - Spanish
    - German
    - French

2.14. Content Summary: Non-Academic

50. ART

51. MUSIC

52. TECHNOLOGICAL ARTS
    - Industrial Arts
    - Home Economics

53. PHYSICAL EDUCATION (Supervised)

54. PERCEPTUAL DEVELOPMENT

55. MANAGEMENT/PROCEDURAL

56. RECREATION/BREAK

57. PERSONAL EXPERIENCES/FEELINGS

58. OTHER ACTIVITY

Other Academic Content Category Definitions

40. PHYSICAL/BIOLOGICAL SCIENCES--An activity primarily involved with knowing about matter, energy, plants and animals.

Examples: a. Physics, chemistry, geology, anatomy, meteorology, biology, astronomy.

41. SOCIAL SCIENCES--An activity primarily concerned with humans and their living together.

Examples:
a. Social Studies,
b. Geography (human),
c. Sociclogy, pyschology,
d. Current events, government, politics,
e. History,
f. Economics,
g. Political science, law,
h. Anthropology,
j. Art history.

42. FOREIGN LANGUAGE--An activity primarily involved with reading, writing, or conversing in other than the native tongue.

Examples:
a. Spanish,
b. French,
c. Russian,
d. Latin,
e. Turkish,
f. Hebrew ...

Note: If any math or reading is involved in these other academic activities, be sure to code the specific math or reading category in addition to the other academic category.

50. ART--An activity primarily involved with visual representation for aesthetic purposes.

Examples:
a. Sketching, painting, sculpturing,
b. Film-making,
c. Silk-screening, tye-dye,
d. Jewelry making,
e. Art appreciation.
f. Drawing, coloring
g. Making valentines, Christmas cards, room decorations, etc.

51. MUSIC--An activity primarily involved with listening to, making or appreciating organized sound.

Examples:
- a. Singing, chanting, composing, improvising,
- b. Playing instruments,
- c. Music appreciation,
- d. Rhythm bands.

52. TECHNOLOGICAL ARTS--An activity primarily concerned with how to do an occupationally or vocationally related skill.

Examples:
- a. Wood-crafting,
- b. Bookkeeping,
- c. Computer programming,
- d. Cooking, sewing, decorating,
- e. Gardening,
- f. Shop,
- g. Electrical repair,
- h. Knitting, needlework, macrame.

53. PHYSICAL EDUCATION--A supervised and organized activity whose primary intent is bodily exercise and/or gross motor development.

Examples:
- a. Swimming,
- b. Dance,
- c. Gymnastics,
- d. Calisthentics,
- e. Team sports.

54. PERCEPTUAL DEVELOPMENT (Training)--An activity primarily oriented towards sensory and motor (fine) development.

Examples:
- a. Tracing sand paper letters, tracing,
- b. Clapping, snapping,
- c. Cutting, pasting,
- d. Mazes,
- e. Eye-hand coordination (following a finger)
- f. Basic (primary) visual discrimination skills (colors, shapes).

55. MANAGEMENT/PROCEDURAL--Conducting class business unrelated to any instructional activity.

Examples:
- a. Collecting milk money,
- b. Taking attendance, lunch count,
- c. Making arrangements for a field trip,
- d. Filling out administrative forms,
- e. Morning announcements,
- f. Being sent to principal's office,
- g. Fire drill,
- h. Cleaning up room, stacking chairs.

56. RECREATION/BREAK--Any recreational or free period.

Examples:
a. Recess,
b. Unstructured P.E. (like recess),
c. Lunch, milk breaks,
d. Non-instructional games,
e. Attending school concert, assembly, basketball game
f. Class party.

Don't code as break: brief unscheduled trips to restroom, drinking fountain, etc., unless there is a specified period of time for all students to do this.

57. PERSONAL EXPERIENCES/FEELINGS

57.1 Personal Experiences--Primary focus is on the telling of a past experience of the learner or teacher. (Only code if it is clearly the focus of the activity, not just in passing.)

Examples:
a. Telling about personal experiences at home or elsewhere,
b. Show and tell,
c. Talking about experiences on a recent field trip.

57.2 Personal Feelings--The primary focus is on current emotions of the learner or teacher; or feelings about some personal problem he/she now owns. (Only code if it is clearly the focus of the activity.)

Examples:
a. Affective education programs,
b. Discussion of a recent traumatic or exhilarating experience (death or injury of a close person, winning a tournament)
c. Discussion of feelings/attitudes about classroom problems (e.g., rules, discipline).

58. OTHER ACTIVITY--Some organized instructional activity that cannot be clearly coded by any of the above content categories. Be sure to describe.

(Code only in reading/ math related tasks)

ALTOS
REAL-TIME CODING SHEET

TIME	1. LEARNER MOVES	INSTRUCTOR 2. MOVES	INSTRUCTOR 3. FOCUS	NOTES
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(*Code only in reading/ math related tasks*)

ALTOS
REAL-TIME CODING SHEET

TIME	1. LEARNER MOVES	INSTRUCTOR 2. MOVES	INSTRUCTOR 3. FOCUS	NOTES
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3.1 Definitions of Real-Time Coding Categories for Target Student, Instructor and Focus

These categories are to be used for coding on the Real-Time Sheet only for educational activities which require the target student to engage in any reading or mathematics related tasks--even though the subject may be officially called something else (e.g., science, social studies, music).

Learner Moves (Target Student [TS] only)

EW: ENGAGED-WRITTEN

TS makes a substantive non-oral (usually motoric) reading or math response that allows the observer to determine engagement and task difficulty level directly.

Examples:
- writing answers to math or reading problems/questions
- measuring in math
- using manipulatives in math (e.g., cuisenaire rods, abacus, pocket calculator)
- writing spelling words
- drawing a geometric figure in math
- capitalizing and punctuating a sentence on worksheet
- circling an answer on a language arts task

EO: ENGAGED-ORAL

TS makes a substantive oral response in math or reading that allows the observer to determine engagement and task difficulty level directly.

Examples:
- oral reading
- answering a substantive question in reading/math
- asking a substantive question in reading/math
- making a relevant comment in reading/math
- singing while reading lyrics

Note: EW and EO are not used for TS responses concerning the directions or structure of the task--see ED below. EW and EO must pertain to the substance of the task itself.

EC: ENGAGED-COVERT

TS is oriented to the substance of a reading/math task, but is showing no observable response that allows the observer to determine engagement and task difficulty level directly.

Examples:
- silently reading and listening to another student read orally
- watching T demonstrate how to do a math problem at board
- listening to questions and answers about a story that was read
- silent reading of text
- pondering over a story problem in math
- listening to T explanation on suffixes and prefixes

> Note: EC is not used for TS behavior related to the directions or structure of the task--see ED below.

ED: ENGAGED-DIRECTIONS

TS is engaged in listening to, reading, asking about, or carrying out directions that do not involve the academic substance of the reading/math task itself. (The response mode is not differentiated here.)

Examples:
- TS is writing name on top of paper and numbering lines for spelling words to be given.
- TS is listening to T give the next math assignment.
- TS asks a question about what s/he's supposed to do on the reading assignment.
- TS is copying directions from the board for the math seatwork.

NI: NOT ENGAGED-INTERIM

TS is involved with some activity that is part of a reading/math task, but does not involve the substantive content or directions of the task.

Examples:
- sharpening pencil
- hands in paper
- getting books relevant materials
- opening book, finding page
- checking off on a chart items completed during task
- passing out papers

Ground Rule: Code engagement over non-engagement if both occur together--e.g., if T is giving directions and TS is listening while also finding his/her pencil and page in the math book, code ED, not NI.

NW: NOT ENGAGED - WAIT

TS is not engaged in a reading/math task because s/he is waiting for the teacher or another student.

Examples:
- waiting for help from T
- walking up to T's desk and waiting for his/her paper to be graded
- waiting for T to return to the group that TS is in and which cannot continue without T

- waiting for T or another S to pass out papers
- waiting for T to write problems on the board
- waits for T to give next spelling word
- TS has finished current part of task and is waiting for next part

Note: If TS is NW then code instructor move as NULL.

NO: NOT ENGAGED - OFF TASK

TS is not involved in the reading/math task in any way, not even in a peripheral part of the task.

Examples:
- Socializing
- Daydreaming
- Disruptive behavior
- Doodling, passing notes
- Shuffling aimlessly through text pages
- Getting a drink, going to restroom

Note: Teacher disapproval is not a necessary condition for NO.

Ground Rule: TS engagement in reading/math always takes priority over non-engagement in some other task. We always want to know when TS is engaged in reading or math, regardless of what other intentions the teacher may have. For example, suppose the "official" activity is art--all the students are expected to work on their collages during the art period, but TS decides instead to read a book from the library. From the point of view of the art activity, TS is NO (not engaged-off task). However, TS is engaged in reading (EC). In this case, the observer should code the content on the educational activity sheet as reading practice (# 14) (not art), and code TS engagement from the point of view of the reading activity (EC).

Instructor Moves

General Note: The instructor is usually the classroom teacher, but need not be. Another student could be tutoring TS--thus the peer is the instructor. The instructor could also be an aide, a teaching machine, or even the curriculum materials if they provide feedback to TS on his/her responses. You will code who the instructor is on the educational activity sheet. You will code the instructor move on the real-time coding sheet, regardless of who or what the instructor is, only when:

1. The instructor move is relevant to the reading or math content; AND

2. The instructor move is relevant to the TS move coded for that event.

AM: ACADEMIC MONITORING

An instructional move that consists only of looking at or listening to a TS response during a reading/math task. It must be directed toward the substantive, academic responses of the TS. (Observation of TS task engagement, where the instructor is not in a position to evaluate how well TS is doing on the task, is not AM--it is null.)

Examples:
- T stops at TS's desk and looks at his/her work (written responses during math seatowrk)
- T watches TS work math problem at board.
- T looks at TS's spelling words during spelling test.

Note: Suppose TS is engaged in math seatwork (EW), and T is monitoring some other student's seatwork responses. This would not be coded AM, because the instructor move is not relevant to the TS move. In this case the instructor move is NULL, with respect to TS's move.

AF: ACADEMIC FEEDBACK

The instructor informs TS that TS's written/oral response in math/reading was correct or incorrect, or provides TS with the correct response but no explanation is given as to why it is correct.

AF can be implicit as in TS oral reading, when T is listening--by not stopping TS, T is implying that TS is reading correctly. Or flash card drill in math, when T goes to next card without comment it implies that TS was correct on the last one.

Examples:
- T says to TS, "Good. That's right."
- T says to TS, "No, the answer is 53."
- TS looks at T marks and corrections on his spelling test (only code AF when TS is actually looking at the written feedback).
- A peer is grading TS's math quiz (students have traded papers and T is going over the answers with class), and peer says to TS; "You got that one right."
- TS is checking his math problems against answers in back of book (or on another sheet)
- Another student is reading orally and TS is silently reading (following along).

- TS is listening to audiotape/record and silently reading along
- TS is in group singing and reading lyrics, and if T can be heard above the rest, this is AF (to the group)
- T is going over answers to reading assignment so that TS can follow along, and TS is correcting his/her own paper
- T listens to several of TS's oral answers and only stops TS if TS makes a mistake (i.e., it is implied that TS is correct by lack of T interruption)

AQ: ACADEMIC QUESTION

The instructor is asking TS to provide a written or oral answer to a substantive reading/math problem or question.

Examples:
- Spelling--TS is required to spell a word aloud or on paper.
- T reads a passage aloud from which TS is to find a certain type of word.
- A peer shows TS a flash card and TS is supposed to respond.
- T gives a test orally to class on a problem x problem basis--i.e., "No. 3. Which countries were concerned about the seals?" (in a story just read silently).

XN: EXPLANATION - NEED

The instructor is giving an explanation that is provided to satisfy a clear and immediate need for TS help with a substantive reading/math problem.

Examples:
- TS is unable to do task or has done it wrong, and T reacts to this by explaining (note if TS is confused about directions, code the T clarification as SD--see below).
- TS asks for help on a problem and T provides it.
- Most of the class, clearly including TS as well, are confused about how to do a problem, so T gives an explanation to the whole class (group focus).

XP: EXPLANATION - PLANNED

The instructor gives explanations on substantive content in math/reading that do not pertain to an immediate academic need of the TS.

Examples:
- T is lecturing on pronoun reference.
- T is demonstrating a long division problem.
- TS is watching a movie/TV filmstrip where reading/math instruction is being given (e.g., Sesame Street).

Note: If TS is listening to an explanation based on an immediate need of another student, but TS clearly does not have that need, code XP for TS, not XN.

SD: STRUCTURING - DIRECTING

The instructor makes statements about goals or objectives and/or gives directions on a math/reading task.

Note--the statements do not involve the substance of the reading/math content, but are about what the students are to do on the task or why they are to do it.

Note also--any instructor questions, feedback, explanations, monitoring, etc. that have to do with the structure or directions about the task are coded as SD (not XP, XN, FB, AM).

Examples:
- T says, "Open your math books to page 72, and do problems 3, 5, and 8".
- T says, "We need to learn how to spell correctly, so that other people can read what we write".
- T goes over the schedule of activities for the language arts period.
- T briefly reviews the part of the story covered the previous day before beginning an oral reading activity: "We left off the story yesterday when Sammy couldn't find his mother at the grocery store. We were on page 49, the second paragraph. Has everybody found his or her place? Who would like to read first?"

TF: TASK ENGAGEMENT FEEDBACK

The instructor moves to control inappropriate TS task engagement or to praise positive TS task engagement in math/reading. (This is never used when instructor is giving feedback relating to the content of TS's academic responses.)

Examples:
- To TS: "Get back to work."
- To TS: "I see you're really working hard on this reading assignment."
- To group including TS: "Have you finished your math assignment yet?"
- To TS: "Stop that (talking) and finish your spelling words!"
- To group including TS: "I see that everyone's almost finished, and we have 10 minutes left in the math period!"
- To TS: "Shh! I don't want to have to remind you again to be QUIET."

NU: NULL

The instructor move during a math/reading task not relevant to the TS move coded for that event OR it is not relevant in any way to the reading/math task itself.

Examples:
- TS is EW on math worksheet at seat and instructor is grading papers at her desk.
- TS is NO on reading assignment, and instructor is individually helping another student.

- Instructor is out of room and TS is EC in reading science book.
- Instructor is working with reading group of which TS is not a member, and TS is copying spelling words at seat.
- During oral reading group, T interrupts and says. "Oh, I forgot to take lunch count."
- During math seatwork. T says. "Wasn't that an exciting ball game last night?" (TS is listening to T). (This would be coded NO and NU).

Sometimes it can be confusing as to whether to code NU or one of the other instructor moves. For example, suppose T is at board demonstrating a long division problem, but TS is whispering to a friend (off-task). T's behavior is not relevant to TS's but it _is_ relevant to the task. Since TS is clearly _supposed_ to be listening to T, this would be coded NO and XP.

On the other hand, suppose that during math seatwork, TS is EW, T starts to talk to the class about last night's game, but TS ignores T and continues to work. This would be coded EW and NU.

Or, suppose in math seatwork TS is off-task and T says to TS, "Be quiet and finish your worksheet." In this case you would code NO and TF. The instructor move is relevant to TS's non-engagement in math.

Thus, there are two questions to answer:

1. Is the instructor move in a math/reading activity intended for _TS_ engagement at this time? (If not, code NU for the instructor).

2. If so, then is the instructor move related to the substance or directions of the TS math/reading task OR to TS's engagement in that task? (If not, code NU for the instructor. Otherwise, code accordingly as AM, AQ, AF, XN, XP, SD, or TF.)

What about this situation? Suppose T is demonstrating long division at the board and TS is suppose to watch, but is instead reading a library book. First, do we code TS as EC in reading or NO in math? The ground rule is to code TS engagement in math/reading over non-engagement. Thus, the content category should be coded as Reading Practice (# 14), and the TS move as EC. Since, the instructor's move is unrelated to TS's engagement in _reading_, it is coded as NU.

Focus of Instructor

Here we want to distinguish between instructor moves directed specifically to TS vs. those directed to someone else in the group (of which TS is a member) or to the group as a whole. The focus is coded in addition to the type of instructor move (see above).

TS: TARGET STUDENT IS FOCUS

The instructor move is clearly and specifically directed to the TS.

Examples:
- TS is having difficulty with a math problem and T is giving TS individual help.
- T says to TS in oral reading after a TS miscue, "Look at the first two letters. What sound do they make?"
- T is looking over TS's shoulder while monitoring seatwork.
- T tells TS to stop talking and get back to work.
- T tells TS, "That's correct. Go on."

GR: GROUP IS FOCUS

The instructor move is directed toward another student in the group (of which TS is a member) or to the group as a whole?

Examples:
- To reading group: "Who can tell me what happened to Bobby (in the story just read)?"
- To another S in reading group who has made a miscue (and TS is supposed to listen): "Look at the first two letters. What sound do they make?"
- Whole class is going over spelling test and T says, "The first word is spelled, B-E-A-U-T-I-F-U-L."
- T is demonstrating long division at board to whole class.
- T is correcting another S's mistake on math problem and TS is listening and watching.

Note: If the instructor move is coded as NULL, then the focus must be coded NULL as well.

Procedures for Real-Time Coding in Math/Reading

When an activity ACTUALLY begins you record the time started on the Educational Activity Sheet. At this time, you may not know if the activity will involve any TS math or reading related tasks. To be safe, you should begin coding on the Real Time Coding Sheet, until it is clear if a math/reading task is involved. If not, then cross out the real-time codes you have made thus far and discontinue real-time coding. Otherwise, continue real-time coding until the math/reading activity ACTUALLY ends for TS.

The procedure we will use for real-time coding is called "point-time sampling". We will not code every TS move, instructor move and focus, but only code what is occurring at one-minute intervals. Since we only sample every minute, we will lose some information about TS and instructor behavior, but this is off-set by the many days of observation for a given TS. More importantly, it makes your job as a coder much easier than if you were required to code continuously in real-time throughout math/reading activities.

At each sampling point, you take a "mental snapshot" of what is occurring during the next five seconds (approximately). Then you record four things: 1) the time at the sampling point; 2) the TS move; 3) the instructor move; and 4) the instructor focus. Then you wait until the next sampling point and record again, etc., until the end of the activity. While you are waiting between sampling points, you won't be coding but you will be observing the TS and instructor so that you will know the context for the next sampling point.

When you code, this "mental snapshot" should reflect the relationship that exists between the TS move and instructor move and focus that best "captures the moment". For example, at the sampling point (11:08 a.m.) suppose T is demonstrating to the class long division problems at the board and TS is watching. This would be coded:

ALTOS
REAL-TIME CODING SHEET

TIME			1. LEARNER MOVES	INSTRUCTOR		NOTES
				2. MOVES	3. FOCUS	
1	*1: 0*	*3*	*EC*	*XP*	*GR*	*Long division demo*

At 11:09, during the demonstration, TS is whispering to a peer. This would be coded:

1	*1 : 0*	*9*	*NO*	*XP*	*GR*	*Long division demo*

At 11:10, the teacher specifically reprimands TS, who listens to T:

1	*1 : 1*	*0*	*NO*	*TF*	*TS*	*"Pay attention"*

Note here, that when T gives the reprimand (TF), TS is paying attention to the reprimand at the sampling moment, but the T behavior is related to TS's previous off-task behavior. Thus, we capture the sequential relationship between the teacher and learner behaviors, by coding the NO to which the TF refers.

At 11:11, the teacher answers TS's question about the directions for the math assignment:

1	*1 : 1*	*1*	*ED*	*SD*	*TS*	*TS confused about assignment*

Again, the SD refers to TS's prior question (ED) about what to do on the assignment.

Later in the lesson, TS asks a question about a problem he is having difficulty with and T proceeds to help him:

1	1 : 2	9	EO	XN	TS	TS stuck on problem

Here, the XN refers to the question (EO) asked by the TS:

The sequence could also be from T to TS, as T asks a question in reading at the sampling moment, and TS then answers orally:

0	9 : 3	2	EO	AQ	TS	

Here, the EO follows the AQ, and is coded because it is part of the sequence of events at the sampling point.

These prior/posterior sampling codes only pertain to when there is a direct interaction between the instructor and TS. In these situations we want to best capture their interaction. In other situations, the sampling point will consist of simultaneous codes for the ongoing event. For example, another student is reading orally, TS is following along, reading silently, and T is acknowledging the correct reading of the other student by allowing him to continue:

0	9 : 1	5	EC	AF	GR	Oral reading

At the sampling moment, TS is EC and AF is to the reading group (the other student), and thus, the AF is relevant to TS's silent reading.

What to Do When Multiple Events Occur at the Sampling Point

Sometimes the interaction will be so fast that several learner moves or instructor moves occurred during the five-second interval in which you took a "mental snapshot" at the one-minute sampling point. For example, TS may ask a substantive question (EO) to which T listens (AM) and then T answers TS's question (XN) while TS listens to the explanation (EC). All of this occurs right at the sampling point. Which codes should you record? To help you make this decision, priority heirarchies are given for TS and instructor moves:

Priority Hierarchy for TS Moves:

1. EW and EO
2. EC
3. ED
4. NI, NW, NO

Engagement always takes precedence over non-engagement, if both occur together.

Priority Hierarchy for Instructor Moves:

1. XN
2. XP
3. AF and AQ
4. AM
5. SD
6. NU

In the above example, you should have coded, according to the hierarchies:

0	9 : 3	4	EO	XN	TS	

Since EO takes precedence over EC, you should code EO, and since XN takes precedence over AM, you should code XN.

As another example, if T is listening to TS read orally (AM) but also implies that TS is reading correctly by not interrupting (AF), then you would code AF for the instructor move, since AF takes precedence over AM. Or, if T gives feedback (AF) and also an explanation as to why TS's response was incorrect (e.g., "No, receive is spelled R-E-C-E-I-V-E. Remember the rule: _i_ before _e_ except after _c_ "), you would code XN, because XN takes priority over AF. Or, if TS is listening to T directions (ED) while also getting materials for the task (NI), you would code ED, since ED takes priority over NI.

Remember, however, that these priority rules apply _only_ when multiple TS or instructor moves occur right at the sampling point. Otherwise, if there is only a single TS and instructor behavior each occurring at the sampling point, then you simply code them. For example, it may have been the case that 30 seconds _prior_ to the sampling point TS asked a question which T answered, but later _at_ the sampling point T has continued the lecture and TS is listening. Here you would code EC and XP, since the earlier EO and XN did not occur during the sampling point.

Ground Rule for Real-Time Coding of Reading/Math in Other Content Areas

Sometimes reading or math tasks will occur within another content area (e.g., in science, social studies, music), but the reading/math tasks occupy only a small portion of the overall activity in the other content area. That is, the reading/math tasks are not the principal part of the activity. For example, in a half-hour music lesson, only 10 minutes may be devoted to reading the lyrics during choral singing and the remaining 20 minutes are spent practicing on musical instruments. Should you code in real-time for the entire half hour? No.

Ground Rule: You only need to real-time code during the part of the "other" content area in which reading/math tasks are required.

Thus, in the above music lesson you would only code in real-time during the lyrics reading and choral singing, since that is the only part of the activity which required reading.

However, remember that this ground rule applies only when math/reading is coded as the SECONDARY content area on the educational activity sheet. Whenever math or reading is the PRIMARY content area, then you must real-time code for the entire duration of the activity.

APPENDIX C

ALTOS TEACHER LOG MANUAL

Reference Manual for Teacher Logs
on Student Academic Learning Time
and Success Rate

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Indiana University
Bloomington, Indiana

Table of Contents

Introduction 1

Directions for Completing the Log 2

Weekly Teacher Log of Student Activities 5

Appendix 17

Reading Content Categories Summary 19

Reading Content Categories Definitions 21

Math Content Categories Summary 33

Math Content Categories Definitions 34

Other Academic Content Category Definitions 44

Introduction

We expect you to keep a log on academic activities for selected students in your classroom for a period of 10 weeks during this semester (not counting the week of vacation at Spring Break). Once you have learned how to use the log forms provided, it should take no more than 5 minutes of your time per day per target student on whom you keep a log.

An entire student log is organized into 10 booklets, one for each week. Each booklet has a cover sheet plus 5 pages stapled together. The cover sheet serves to identify you, your target student, your school, and the dates of the week. Each of the remaining 5 pages in a booklet is used for logging each day of that week. Completed log booklets will be collected on a weekly basis.

Important--you only need to record ACADEMIC ACTIVITIES in the logs, and only those intended for the TARGET STUDENT. An academic activity is one which involves reading (language arts--including spelling, grammar, and composition), mathematics, science, social studies, or foreign language. You should not record non-academic activities such as music, art, recess, physical education, lunch, free time, etc., in the logs.

Take a few minutes now to look at the directions and sample log on the next several pages. Note that you will keep a separate log for each selected target student, so that one booklet represents the academic activities for one student for one week.

Directions for Completing the Log

1. Complete the cover sheet (at the beginning of the week):

   -student name
   -your name
   -school
   -dates of this week

2. Complete a log sheet for each day:

   -Circle the proper day at the top.
   -Use one line for each academic activity:

   a) Enter the academic subject area code number(s) which describes the type of activity the target student was expected to do. (See appendix for definitions and examples of each type of activity).

   b) Briefly describe the task required of the target student in terms of student behavior (e.g., read orally; solve long division problems (like 42)234); write answers to reading comprehension questions; respond to vocabulary flash card drill; watch movie; listen to and discuss current events; copy spelling words; write book report).

   c) Indicate the times at which this activity started and stopped (e.g., 9:15 to 9:45). Please try to be accurate to the nearest five minutes for starting and stopping times.

   d) Circle the target student success rate for this activity as HI, MED, or LO. Note the definitions given on the bottom of the log sheets. Success rate applies to the activity as a whole. So, for example, if the target student did one part of the activity very well and another part very poorly, you would circle MEDium. If the target student does very well on all parts of the task you would circle HIgh; or if the target student does very poorly on all parts of the task you would circle LOw.

   e) Indicate specific materials used (e.g., teacher-made math worksheet; Cuisenaire rods; DISTAR II Math, pages 81-82; Cat in the Hat (Dr. Suess), pages 1-9; On Sets (game--Layman Allen); multiplication facts flash cards; basic addition facts speed test; SRA Reading 1 workbook, page 23).

   f) Repeat steps 2a to 2e for each academic activity that day.

Note: If the target student is absent, write "ABSENT" on the log sheet for that day. Do not log activities for which the target student was not present.

3. At the end of the week, check over the booklet to make sure it is complete. Then write any pertinent comments on the cover sheet (e.g., "______ has been ill and not back to full strength yet. She got over-tired and so didn't complete or try to do many activities." or "_____'s grandmother died last week. He's just not himself lately--moody, can't concentrate. This is not typical of his usual work.")

WEEKLY TEACHER LOG OF STUDENT ACTIVITIES

Target Student: Benjamin Blizzard

Teacher: Darla Cohen

Dates (week of): 3/2 Monday thru 3/6/81 Friday

School: University Elementary

Special Comments on Target Student Activities this Week:

Absent on Friday. Missed usual tests that I give to check progress on Fridays.

CIRCLE DAY ⇨ [✓ Monday] Tuesday Wednesday Thursday Friday

Academic Subject Area Code(s)*	Task Required of Target Student	Times Started		Times Stopped	Target Student Success Rate**	Specific Materials Used
20 add/subtract	complete 30 problems	8 : 45	TO	9 : 15	[✓ HI] MED LO	math worksheet (teacher made)
14 Rdg. practice	read orally	9 : 15	TO	9 : 45	HI [✓ MED] LO	level 3 Holt p.51 Rhymes & Tales
13 Comprehension	answer questions completed 5/7	9 : 45	TO	10:00	HI [✓ MED] LO	level 3 Holt Work book p. 19
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	

*Content Codes (only use more than one code per task when it has multiple parts, each describable by a different content code):

READING

10. Decoding/Phonics
11. Word Structure
12. Word Meaning
13. Comprehension
14. Reading Practice
15. Spelling
16 Grammar
17 Composition (Creative Writing)
18 Reading Related--Other
19. Reading Below Test Level (copying)

MATH

20. Addition/Subtraction (no regrouping)
21. Addition/Subtraction (with regrouping)
22. Computational Transfer
23. Place Value/Numerals
24. Multiplication
25. Division
26. Fractions/Decimals
27. Spatial Application
28. Verbal Application (word problems)
29. Math Related--Other
30. Math Below Test Level

OTHER ACADEMIC

40. Science
41. Social Studies
42. Foreign Language
43. Other--Specify

** HI SUCCESS = made few or no mistakes on the task (errors due to carelessness).
MED SUCCESS= between HI and LO.
LO SUCCESS = made almost all mistakes or unable or no attempt to do task (correct answers due to chance or luck).

CIRCLE DAY ⇨ Monday [✓ Tuesday] Wednesday Thursday Friday

Academic Subject Area Code(s)*	Task Required of Target Student	Times Started		Times Stopped	Target Student Success Rate**	Specific Materials Used
21 Add / Subtract	Complete 15 problems	8:45	TO	9:15	HI [✓ MED] LO	Scott Foresman p.22 Math Book level 3
17 Composition	Write story for assigned topic	9:15	TO	10:00	HI MED [✓ LO]	Topics in TE level 3 Holt Reader
14 Rdg. Practice	Read Orally	10:15	TO	10:30	HI [✓ MED] LO	Level 3 Holt Reader p. 53
13 Comprehension	Answer Questions 4/4	10:30	TO	10:45	[✓ HI] MED LO	Level 3 Holt Reader p. 55
40 Science, 13 Comp.	Read directions plant bean seed	10:45	TO	11:30	[✓ HI] MED LO	Teacher made list of directions, bean seed, dirt, H_2O
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	

*Content Codes (only use more than one code per task when it has multiple parts, each describable by a different content code):

READING	MATH	OTHER ACADEMIC
10. Decoding/Phonics	20. Addition/Subtraction (no regrouping)	40. Science
11. Word Structure	21. Addition/Subtraction (with regrouping)	41. Social Studies
12. Word Meaning	22. Computational Transfer	42. Foreign Language
13. Comprehension	23. Place Value/Numerals	43. Other--Specify
14. Reading Practice	24. Multiplication	
15. Spelling	25. Division	
16 Grammar	26. Fractions/Decimals	
17 Composition (Creative Writing)	27. Spatial Application	
18 Reading Related--Other	28. Verbal Application (word problems)	
19. Reading Below Test Level (copying)	29. Math Related--Other	
	30. Math Below Test Level	

** HI SUCCESS = made few or no mistakes on the task (errors due to carelessness).
MED SUCCESS= between HI and LO.
LO SUCCESS = made almost all mistakes or unable or no attempt to do task (correct answers due to chance or luck).

CIRCLE DAY ⇨ Monday Tuesday [✓ Wednesday] Thursday Friday

Academic Subject Area Code(s)*	Task Required of Target Student	Times Started		Times Stopped	Target Student Success Rate**	Specific Materials Used
21 Add/Subtract	Complete 10 problems in 15 min.	8:45	TO	9:00	[✓ HI] MED LO	Scott Foresman TE p. 23, board
14 Rdg. Practice	Read Orally	9:00	TO	9:30	HI [✓ MED] LO	Holt level 3 Reader p. 56
12 Word Meaning	Complete worksheet 5 story words defined	9:30	TO	9:45	HI MED [✓ LO]	Holt level 3 Workbook p. 32
10 Decoding/Phonics	Circle words that follow silent "e" rule	9:45	TO	10:00	HI [✓ MED] LO	Ditto - Pretest level 4 Holt
40 Science	check plant, water	10:00	TO	10:15	[✓ HI] MED LO	plant, H_2O
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	
		:	TO	:	HI MED LO	

*Content Codes (only use more than one code per task when it has multiple parts, each describable by a different content code):

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10. Decoding/Phonics
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21. Addition/Subtraction (with regrouping)
22. Computational Transfer
23. Place Value/Numerals
24. Multiplication
25. Division
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27. Spatial Application
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MED SUCCESS= between HI and LO.
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CIRCLE DAY ⇨ Monday Tuesday Wednesday [✓ Thursday] Friday

Academic Subject Area Code(s)*	Task Required of Target Student	Times Started Stopped	Target Student Success Rate**	Specific Materials Used
23 Place Value	Complete 10 problems	8:45 TO 9:00	HI [✓ MED] LO	Ditto Worksheet
14 Rdg. Practice	Read Orally	9:00 TO 9:30	HI [✓ MED] LO	Level 3 Holt Reader p.58-60
11 Word Structure	Divide 20 words into syllables	9:30 TO 10:00	HI MED [✓ LO]	Level 3 Holt workbook p. 23
15 Spelling	Write Spelling Words (Test)	10:00 TO 10:30	HI [✓ MED] LO	Spelling List paper, pen
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	

*Content Codes (only use more than one code per task when it has multiple parts, each describable by a different content code):

READING

10. Decoding/Phonics
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** HI SUCCESS = made few or no mistakes on the task (errors due to carelessness).
MED SUCCESS= between HI and LO.
LO SUCCESS = made almost all mistakes or unable or no attempt to do task (correct answers due to chance or luck).

CIRCLE DAY ⇨ Monday Tuesday Wednesday Thursday [✓ Friday]

Academic Subject Area Code(s)*	Task Required of Target Student	Times Started Stopped	Target Student Success Rate**	Specific Materials Used
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	
		: TO :	HI MED LO	

absent

*Content Codes (only use more than one code per task when it has multiple parts, each describable by a different content code):

READING

10. Decoding/Phonics
11. Word Structure
12. Word Meaning
13. Comprehension
14. Reading Practice
15. Spelling
16 Grammar
17 Composition (Creative Writing)
18 Reading Related--Other
19. Reading Below Test Level (copying)

MATH

20. Addition/Subtraction (no regrouping)
21. Addition/Subtraction (with regrouping)
22. Computational Transfer
23. Place Value/Numerals
24. Multiplication
25. Division
26. Fractions/Decimals
27. Spatial Application
28. Verbal Application (word problems)
29. Math Related--Other
30. Math Below Test Level

OTHER ACADEMIC

40. Science
41. Social Studies
42. Foreign Language
43. Other--Specify

** HI SUCCESS = made few or no mistakes on the task (errors due to carelessness).
MED SUCCESS= between HI and LO.
LO SUCCESS = made almost all mistakes or unable or no attempt to do task (correct answers due to chance or luck).

APPENDIX

2.11. Reading Content Categories Summary

Category # Category Name

10. DECODING/PHONICS
    - single consonants
    - consonant blends and digraphs
    - variant consonants (c or g)
    - short vowels
    - long vowels
    - other decoding

    EXAMPLES

11. WORD STRUCTURE
    - compound words
    - root words and affixes
    - syllables

12. WORD MEANING
    - synonyms
    - pronoun reference
    - other word meaning

13. COMPREHENSION
    - verbatim (no rephrasing)
    - translation (paraphrase)
    - inference/synthesis
    - identifying main ideas
    - evaluation of fact and opinion
    - other comprehension

14. READING PRACTICE
    - sight words (general practice at reading single words)
    - oral reading of text
    - silent reading of text
    - reading in content areas
    - listening while reading

15. READING RELATED - SPELLING

16. READING RELATED - GRAMMAR

Reading Content Category

Definitions

10. DECODING/PHONICS -- learning letter-sound correspondences

A number of different tasks can be used in exercises aimed at teaching decoding; for example:

a. The child could be asked to give the sound associated with a particular letter or group of letters.

b. The child could be asked to read words with a common sound or with a rhyming pattern.

c. The child could be asked to recognize or identify a word containing a particular sound.

d. The child could be asked to write words with a particular sound. (Spelling or dictation are decoding tasks when they focus on a particular spelling pattern.)

e. The child could be asked to match words containing the same sound.

f. The child could be asked to locate all the words in a list or story which have a particular sound or spelling pattern.

g. Even fill-in-the blank exercise can be decoding, if the choice the student must make depends on and teaches accurate decoding.

For example:

Mary put the ____________ around the package.

sting
bring
string

What these tasks (and others not listed) have in common is that they pair particular letters or groups of letters with particular sounds and they teach students to make the association.

Note: Sometimes, particularly in some basal reader programs, students will read single words where the lesson does not focus on a particular spelling-sound correspondence. This would be coded as reading practice (#14)--sight words. See that category for further discussion.

10.1. Single Consonants

Single consonants located in any position in a syllable or word.

Examples: /t/ in tan, bat, ate

10.2. Consonant Blends and Digraphs

Common combinations of consonants, located in any position in a syllable or word.

Examples: Blends include st, tr, fl, cr, sp, spr, thr, nd, etc. as in flower, spread, sand

Digraphs include sh, ch, th, wh as in where, thin, wash.

10.3. Variant Consonants (c or g)

Most consonants have one dominant letter-sound correspondence. Some consonants are variable; they have 2 common patterns.

Examples: cat vs. city; goat vs. gentle

Tasks: To fall in this category, teaching tasks should compare and contrast the two decodings of the same letter. The student might have to decide which sound was appropriate in a particular word, or with a particular vowel following the consonant (ca vs. ci).

10.4. Short Vowels

Regular short vowel sounds of a, e, i, o, u.

Examples: bat, red, sick, pond, fun

10.5. Long Vowels

Regular long vowel sounds of a, e, i, o, u.
Two major types of spelling patterns produce these sounds - final e and digraphs.

Examples: bake; rain
these; mean, feet
fine
pole; boat
huge

10.6. Other Decoding

Besides the basic categories above, other specific decoding patterns might be taught.

Examples: Complex vowel combinations such as dipthongs (oi, ou, oo, aw, etc.)
Sounds of "y" as a vowel (as in cry, candy)
Effects of consonant context on vowel decoding (vowels followed by "r" as in cart or fair; vowels followed by "l", as in tall)
Silent consonants (know, ghost)
Etc.

11.0 WORD STRUCTURE -- analysis and meaning of word parts

11.1 Compound Words

Two meaningful words are combined to form a new word, which takes its meaning from the parts.

Examples: mailbox, goldfish

Tasks: Students might be asked to identify the parts, combine parts to create new wotds, or identify words which are compounds.

11.2 Root Words and Affixes

Prefixes and/or suffixes added to a root word

Examples: suffixes like -ly, -ful, -less, -able, -er, -est, -tion, etc.

prefixes like un-, re-, mis-, trans-, pre-, ex-, in-, etc.

grammatical endings like -s, -ed, -ing

(Includes spelling changes like doubling the consonant, dropping the final e, or changing y to i. Also includes irregular forms like go, goes, went, gone, going.)

Tasks: Students might have to identify root words, identify affixes in words, or add affixes to words. Includes work on the meaning of affixes and on the correct use of word forms in sentences (John is ________________ up the street.)
walk
walked
walking

The student might have to decide which prefix or suffix was needed to create a particular meaning, or the student might have to figure out the meaning of a word from the meaning of the parts.

11.3. Syllables

Conventional or sound-based units rather than meaningful units.

Examples: demonstration = dem on stra' tion (4 syllables)

Tasks: Students might have to identify the first or last syllable in a word, or break a word into syllables, or determine the number of syllables in a word. Included work on locating the accent or stress in a word.

12.0. WORD MEANING -- Understanding the meaning of a specific word or phrase

12.1. Synonyms

Two words which mean about the same thing.

Examples:
vibrating ship = shaking ship
discover a cave = find a cave
little = small
everyone = all

Tasks: Students might be asked to name a word that means the same thing as another word. Or students might be asked to match words that are synonyms.

12.2 Pronoun reference

The meaning of a pronoun comes from the noun to which it refers.

Examples: Lisa tried to open the window.
It was stuck.
(What does "it" mean? window)

Tasks: The student might be asked to identify the noun a pronoun refers to (as above). Or the student might be asked to fill in the appropriate pronoun for an incomplete sentence.
(John handed the teacher __________ homework paper.)
her
his
its

12.3. Other word meaning

Meanings of words alone or in the context of a sentence

Examples: Definitions, including using dictionary entries to define words

Defining words from context (using the meaning of a sentence to figure out the meaning of an unfamiliar word or a word with multiple meanings)

John used the term "habeas corpus" in his speech about law.

term means

A. a period of time
B. an assigned time to serve
C. a word with an exact meaning
D. a condition or requirement

Using words in sentences (writing a sentence that shows the meaning of a new vocabulary word)

Antonyms (words opposite in meaning)

Figurative Language (recognizing the meaning of a word or phrase used in a nonliteral sense, including simile, metaphor, and idiomatic expressions)

> "John laughed his head off."
> means "John laughed a lot."

Crossword Puzzles

Classification of words (apples, oranges, and peaches are fruit).

Tasks: The student might be asked to give the meaning of a word, match a word with its definition, or write a sentence using a particular word.

13.0 COMPREHENSION - Understanding of ideas expressed in written material, including understanding of literature and understanding of written material in the content areas (science and social studies)

The story below will be referred to in the examples of the comprehension categories. Time spent reading the story would be coded in Reading Practice. Time spent answering questions, writing about, or discussing the story would be coded in Comprehension.

SAVING THE SEALS

Who owns the sea? The ships of all countries sail the open seas. Not long ago, all countries could fish and hunt in the ocean as they pleased. Now, the countries using the sea must work together to protect the sea's animal life.

In 1870, there were millions of valuable fur seals in the Bering Sea. Ships came from all parts of the world to kill them. Men wanted the animals' fur and the oil from their bodies. By 1910, only about 130,000 seals were left. Even the hunters knew that something had to be done or the seals would disappear.

Four countries owned land near the seals' northern home. In 1911, these countries began plans to control seal-hunting. The governments of Japan, Russia, Canada, and the United States agreed to kill no more seals in the open seas. Because they wanted to protect mother seals and their young, they agreed that only male seals without mates could be killed. Money earned from the skins and oil of these seals was to be divided among the four governments.

Today, large heards of seals swim in the Bering Sea again. By working together, four countries saved the seals in the sea they share.

13.1. Verbatim (no rephrasing)

Understanding and recall of information exactly as stated in the text.

Examples:
1. Where do large herds of seals swim today? (in the Bering Sea)
2. Which governments agreed to kill no more seals in the open sea? (Japan, Russia, Canada, U.S.)
3. Why did they agree that only male seals without mates could be killed? (to protect mother seals and their young)

13.2 Translation (paraphrase)

Recognizing ideas stated in different words; recall of information when ideas are restated; rephrasing of ideas in other words.

Examples:
1. Which countries joined in the agreement to limit seal killing? (Japan, Russia, Canada, U.S.)
2. Describe in your own words what the countries agreed to do.

13.3 Inference/Synthesis

Synthesis of information from different points in a text; understanding of ideas implied by a text; using background knowledge or experience to interpret or extend the ideas in a text; drawing conclusions or predicting outcomes.

Examples:
1. Why were the seals hunted?
   a. People wanted to eat seal meat.
   b. Their fur and oil were valuable.
   c. The seals were eating all the fish.
2. The story does not say so, but it makes you think that
   a. hunters used seal oil on their bodies
   b. seals have little value for hunters
   c. all the seals might have been killed
3. What would happen if only 2 of the 4 countries joined the agreement?

13.4 Identifying main ideas

Recognizing the topic of a passage; identifying and understanding the central or most important ideas being communicated.

Examples: 1. On the whole, this story is about
    a. Russia and Canada
    b. protecting seals
    c. hunting in the Bering Sea

2. What message is the author trying to get across? (It is important to protect animals. Countries need to work together.)

Besides answering questions, this content category includes work on outlining a passage, or recognizing the structure and organization of a passage (superordinate and subordinate elements).

13.5 Evaluation of fact and opinion

Critical analysis of statements and the basis for their acceptance; identifying fact and opinion statements. Also includes evaluation of the qualifications of a speaker/writer and understanding how "loaded" words convey opinions.

Examples: Which statement is a fact rather than an opinion?

a. Seals should be protected.
b. All the seals very nearly died.
c. In 1910, only about 130,000 seals were left.

13.6 Other comprehension

Comprehension of written material which does not fit one of the specific categories above. Also includes situations where a comprehension activity mixes several types of comprehension so thoroughly that it would be impossible to separate the time.

Examples: Following directions

Application of reading skills to real-world materials like signs, menus, TV schedules, etc.

14.0. READING PRACTICE - Practice in reading

Note: All reading activities involve the act of reading. Use the Reading Practice category only for activities where students spend time just reading. We will automatically assume that time in specific skills (decoding, word structure, word meaning, or comprehension) includes some reading practice as well.

14.1. Sight words

General practice at reading single words. No particular decoding focus. Students must integrate a variety of decoding skills in order to read a word on sight.

Tasks: Students read these words at the beginning of a lesson:

slippers bought hurry etc.

Teacher reads a word and the students must circle it:

[✓ watch] was what
liver lives [✓ silver]

Any word reading task where there is no intent to practice specific decoding patterns.

14.2. Oral reading of text

Individual or choral reading of stories by students.

Tasks: Reading circle where students take turns reading aloud from a story.

14.3. Silent reading of text

The student reads a story to himself.

Tasks: Students have time for independent reading. Each student reads to himself. Students might go to the library and read. A student might read when he finishes other work early.

14.4. Reading in content areas

Reading science or social studies material (oral or silent)

Tasks: The student reads silently in the social studies book. The students take turns reading aloud from the Weekly Reader.

14.5. Listening while reading

The student listens while he reads in an accompanying text.

Tasks: The student must be simultaneously reading and listening. He could be listening to a tape or record of a story and reading along. Includes music if the student is both reading and singing.

15.0. READING RELATED -- SPELLING -- matching word sounds with particular configurations of letters

Tasks: The teacher might read a word or sentence and have the students write it. Students might have to decide whether or not a word is spelled correctly. Includes work on homonyms (like "to", "too", "two", or "peace", "piece") and their correct use in sentences. Some lessons may focus on particular patterns in letter-sound correspondence (like sounds of the letter "y", or words with silent "e").

16.0. READING RELATED -- GRAMMAR -- understanding sentence structure and grammatical form.

Examples: Capitalization, punctuation, parts of speech, diagramming sentences

Tasks: Many possible activities involving grammatical concepts.

17.0. READING RELATED -- CREATIVE WRITING -- students make up their own stories and write them.

Tasks: The teacher might have all students write a story about summer vacation. Or students might write their own endings to a story they have been reading.

18.0. READING RELATED -- OTHER

18.1. Study skills

Learning and using skills that help the student acquire knowledge through reading.

Examples: Dictionary skills, alphabetization, table of contents, using the index, using the encyclopedia, card catalog, finding books in the library.

18.2. Other

Other activities which are related to reading.

Examples: Foreign language.

Reading maps or graphs.

19.0. READING BELOW TEST LEVEL -- copying or imitating

Examples: Copying, where the student directly copies letters, words or sentences. Includes penmanship.

CONTEXT CLUES -- A COMMON FORMAT

A common response format in workbook pages, especially in earlier grades, is to ask the student to fill in the blank to complete a sentence. To perform the task the student must read the sentence parts that are given and understand their meaning in order to recognize the element that would complete the thought. He must use the context as a set of clues which define the nature of the missing piece. Understanding the sentence framework is a comprehension process. But the task also involves selecting the best word(s) to fill the blank, and the nature of the choices is critical. To code the content of items in a context clues format, consider the distinctions the child must make in order to select the correct alternative.

The examples below show some of the different ways a context clues format can be used:

Decoding:

Jane ate a red candy ___________.
cane/can

Here the student must not only understand the sentence but also know the role of final e in decoding vowels. Without this knowledge of decoding patterns, the child might know the word he wants to fill the blank but still select the wrong alternative. The purpose of the exercise is to practice decoding rules.

Word Structure:

Tim went _________ down the street
skip
skips
skipping

This exercise teaches correct use of grammatical endings.

Word Meaning:

Susan ran to her house. Then _______ went inside.
she
he
it

This requires pronoun reference.

Some animals have snouts. They are really long __________.
ears
mouths
noses

Because the ocean roars, we need to ________ to be heard.
talk
shout
whisper

In the two examples above, the emphasis is on the meaning of the missing word. The student must consider the semantic distinctions among the choices in order to select the word with the best meaning to complete the sentence.

Choose from these words to complete the sentence below:

lazy dozing buzzed dizzy grazing

Soon, a bee ___________ around the colt's head.

In this example the word choices all have the letter "z". But this decoding element is a constant factor; students don't have to focus on the decoding in order to complete the sentence. Sentence completion focuses on selecting the word with the best meaning. (Note: Time spent reading the word choices and talking about the sound of the letter "z" in these words would be coded as Decoding.

Comprehension:

After reading the story of the Little Red Hen, the student must complete this sentence:

The fox lived in a house made of _______________.
straw
wood
stones

The purpose of questions like this is to check story comprehension; the correct answer depends on having read the story. This question assesses understanding of event data (verbatim).

2.12. Math Content Category Summary

20. ADDITION/SUBTRACTION (NO REGROUPING)

    - standard short form
    - basic facts
    - speed tests

21. ADDITION/SUBTRACTION (WITH REGROUPING)

    - standard short form
    - basic facts
    - speed tests

22. COMPUTATIONAL TRANSFER (Properties, # patterns, missing addends, number sentences with inequalities)

23. PLACE VALUE/NUMERALS (whole numbers)

24. MULTIPLICATION

    - basic facts
    - speed test
    - multiplication algorithm

25. DIVISION

    - basic facts
    - speed test
    - division algorithm

26. FRACTIONS/DECIMALS

27. SPATIAL APPLICATION

    - linear measurement
    - geometry (perimeter, area, # pairs, lines/figures)

28. VERBAL APPLICATION

    - word problems

29. MATH RELATED

30. MATH BELOW TEST LEVEL

Math Content Category Definitions

20. ADDITION/SUBTRACTION--NO REGROUPING

Learning the basic addition and subtraction facts. Finding the sum or difference of problems which do not require the renaming of 10 ones as 1 ten or 1 ten as 10 ones (i.e., no "carrying" or "borrowing").

20.1 Basic facts: Basic addition facts are the sums of two single digit addends up through 9 + 9. The basic subtraction facts are the inverses of the addition facts and therefore include facts up through 18-9.

20.2 Non-regrouping problems in addition: Sums of a single digit and a multiple digit addend or two or more multiple digit addends which do not require the renaming of 10 ones as 1 ten.

$$\begin{array}{r} 10 \\ +\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ +\ 46 \\ \hline \end{array} \qquad \begin{array}{r} 547 \\ +\ 201 \\ \hline \end{array}$$

Includes column addition without regrouping.

$$\begin{array}{r} 6 \\ 4 \\ +\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 20 \\ 30 \\ +\ 10 \\ \hline \end{array} \qquad \begin{array}{r} 21 \\ 13 \\ +\ 15 \\ \hline \end{array}$$

20.3 Non-regrouping problmes in subtraction: Finding the difference between a single digit and a multiple digit number or the difference between two multiple digit numbers which do not require the renaming of 1 ten as 10 ones.

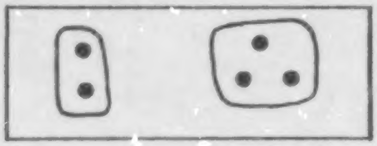
$$\begin{array}{r} 27 \\ -\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 28 \\ -\ 14 \\ \hline \end{array} \qquad \begin{array}{r} 532 \\ -\ 420 \\ \hline \end{array}$$

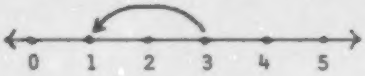
Note: Problems in this category can be presented in a variety of formats.

The problem may be laid out horizontally or vertically:

$$\begin{array}{r} 2 \\ +\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 3 \\ -\ 2 \\ \hline \end{array} \qquad 2 + 3 = \_\_\_ \qquad 3 - 2 = \_\_\_$$

Pictoral representation may be used to help the students understand the basic processes of joining or separating sets and/or as an aid in carrying out the computation involved:





$2 + 3 = \square$ $\qquad\qquad\qquad$ $3 - 2 = \square$

In all of the examples above, the primary task is to find the sum or difference between two numbers when both of those numbers as well as the applicable operational sign are given.

However, there are situations where instructional algorithms or processes involving place value concepts are used in the teaching of these same computational skills and when this occurs the instruction should be coded under category #23.

There are other situations which require more than the straightforward computation of a sum of difference (but do not involve place value) and these situations are discussed in the Computational Transfer Section (# 22).

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21. ADDITION/SUBTRACTION--REGROUPING

Addition problems which require the renaming of 10 ones as 1 ten ("carrying") and subtraction problems which require the renaming of 1 ten as 10 ones ("borrowing"). Here we want to include only the regrouping problems which are presented in the standard computational algorithmic format, also known as the short form.

$$27 + 3 = \_\_\_ \qquad \begin{array}{r} 18 \\ \underline{+\ 14} \\ 32 \end{array} \qquad \begin{array}{r} 13 \\ 15 \\ \underline{+\ 16} \\ 44 \end{array} \qquad \begin{array}{r} 26 \\ \underline{-\ 9} \\ 17 \end{array} \qquad \begin{array}{r} 40 \\ \underline{-\ 15} \\ 25 \end{array}$$

This category is parallel to category 20 in that the student is given two numbers and told to find their sum or difference but in this case the problems also require regrouping. The general guidelines on format in category #20 also apply to this category.

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22. COMPUTATIONAL TRANSFER

Tasks which require the student to recognize and apply some of the operational concepts and patterns within our number system. The student must understand and use the operations which underlie computation, but in a format which involves more than straight-forward computation. Includes:

22.1 Properties:

1. Commutative property of addition and multiplication.

$$3 + 2 = 2 + 3$$

$$2 \times 3 = 3 \times 2$$

2. Associative (grouping) property of addition.

$$2 + (3+5) = (2+3) + 5$$

3. Properties of zero.

Identity element of addition: $18 + 0 = 18$

4. Distributive property.

$$2 \times (3+2) = (2\times3) + (2\times2)$$

$$(12+6) \div 3 = (12\div3) + (6\div3)$$

22.2 Number Patterns: Tasks which promote the student's search for and recognition of the various patterns which can be found among numbers.

Examples:

1. Counting by 2's (odd and even numbers).
2. Counting by 5's, 10's, 20's, etc.
3. Functions - discovering or applying a function rule like add 3, subtract 2, etc.

a. Rule is given: Add 4 to each number in top row:

0	2	5	7	9
4	6			

b. Student must discover and apply the rule to complete the pattern.

1	3	8	4
4	6	11	?

7, 5, 3, ?

{ (1,2), (2,4), (3,6), (4,?) }

22.3 Missing Addends - Open Sentences: Number sentences in which the sum or difference is given and one of the addends or numbers is unknown.

Examples:

$$\begin{array}{r} \boxed{} \\ +\ 3 \\ \hline 7 \end{array} \qquad \begin{array}{r} 4 \\ +\boxed{} \\ \hline 7 \end{array}$$

$\boxed{} - 5 = 5$

$5 - \boxed{} = 2$

$$\begin{array}{r} \boxed{} \\ -\ 3 \\ \hline 4 \end{array} \qquad \begin{array}{r} 7 \\ -\boxed{} \\ \hline 3 \end{array}$$

$\boxed{} + 6 = 10$

$4 + \boxed{} = 10$

22.4 Number Sentences with Equalities and Inequalities - Includes only those number sentences that involve computation plus the use of >, <, =, +, -.

$7 - 6 \textcircled{<} 1 + 3$

$7 \textcircled{>} 4 - 3$

$10 - 10 \textcircled{=} 15 + 5$

$7 \triangle\!\!\!\!\!{\scriptstyle -}\ 2 = 5$

$8 \triangle\!\!\!\!\!{\scriptstyle +}\ 3 = 11$

This category does not include the use of inequality signs in numerical comparisons. i.e.,

$$\left.\begin{array}{r} 27 \textcircled{>} 26 \\ 127 \textcircled{>} 126 \end{array}\right\}$$

This should be coded as #23 (place value/numerals)

22.5 Factors and Multiples: The study of common and least common multiples, common factors, sets of factors, prime numbers, and prime factorization.

Examples:

1. $6 \times \boxed{} = 42$
2. $12 = 2 \times 2 \times 3$
3. Name the multiples of 2, less than 20.

23. PLACE VALUE/NUMERALS

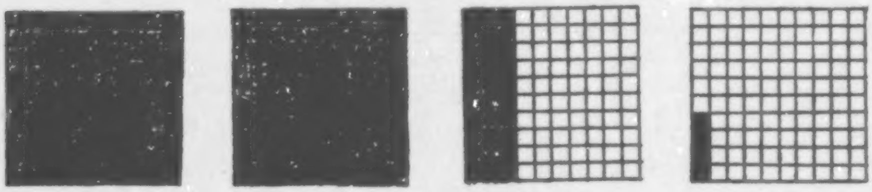
23.1 Place Value/Numerals - Place value involves the concept that a digit has three meanings. It's face value (the meaning it has wherever it is used), it's place value (the meaning it takes from it's place in a numeral), and it's total value (which is the product of the first two values). In the numeral 45, the 4 has a face value of four, a place value of ten, and a total value of forty. Teaching place value will involve expanded and compact notation, identification of the one's, ten's, or hundred's place, and naming the number of tens (or ones, etc.) in a numeral.

Numerals includes understanding the order of the counting numbers and evaluating the sequential position of one numeral in relation to another. Comparing and evaluating numerals will involve place value concepts.

Examples:

A. Place Value:

1. How many tens in 75?
2. Which number is in the one's place?
3. 6 tens and 2 ones = 60 + 2 = 62
4. 155 = 100 + 50 + 5
5. Use of manipulatives or pictures to teach numerical structures.



2 hundreds, 3 tens, and 4

We write 234

B. Numerals

1. Writing the missing numerals.

46			49	

2. What number comes before, after, or between?
3. Using inequalities: 145 > 135.
4. Practice in reading numerals up through millions.
5. Understanding the use of commas to set off the periods (e.g., 1,575,231).

23.2 Addition/Subtraction With or Without Regrouping - Instructional Algorithms With Place Value Transformations:

In our base 10 number system the understanding of place value is essential to the learning of computational skills. With this in mind, curriculum materials often include instructional algorithms or processes which combine place value concepts along with practice in computation. These processes may involve expanded notation or the designation of tens and ones. Some common (depending on text) instructional algorithms are:

$$\begin{array}{rcl} 14 & = & 10 + 4 \\ \underline{+\;14} & = & \underline{10 + 4} \\ & & 20 + 8 = 28 \end{array}$$

(Use of Expanded Notation)

$$\begin{array}{rccc} & & \text{Tens} & \text{Ones} \\ 16 & = & 1 & 6 \\ \underline{+\;14} & = & \underline{1} & \underline{4} \\ & & 3 & 0 \end{array}$$

(Designation of ten's and one's place)

$$\begin{array}{r} 14 \\ \underline{+\;14} \\ 8 \\ \underline{20} \\ 28 \end{array}$$

(Long form with partial addends)

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24. MULTIPLICATION

24.1 Multiplication - Basic Facts: Multiplication with two 1-digit factors. Also known as times table up through 9 x 9.

24.2 Multiplication - Speed Tests: Timed tests in the basic multiplication facts. May also include speeded flash card drill which is specifically aimed at increasing automaticity.

24.3 Multiplication Algorithm: Multiplication with one factor of two or more digits, i.e., all multiplication above the basic facts.

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25. DIVISION

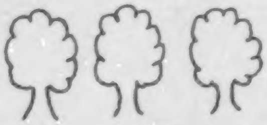
25.1 Division: Division of whole numbers. All levels of difficulty. Includes speed tests in division.

26. FRACTIONS/DECIMALS

26.1 Fractions - Recognizing and identifying a fractional part of a set, region, or line:

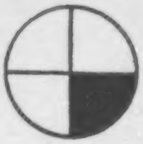
Examples:

a.



Draw a ring around 1/3 of the trees.

b.



What part of this region is shaded?

26.2 Fractions: Computation with fractions including the recognition and identification of equivalent fractions.

26.3 Fractions: Converting decimals into fractions (e.g., .625 = 5/8)

26.4 Decimals: Place value ($\frac{1}{100}$ = .01, .5 > .25); arithemtic operations with decimals (+, −, x, ÷).

27. SPATIAL APPLICATION

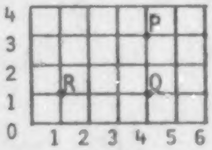
27.1 Linear Measurement - Measuring the length, width, or height of objects, lines, or pictures.

27.2 Geometry - Perimeter: Computing the perimeter of a polygon using standard or arbitrary units of measure.

27.3 Geometry - Area: Computing the area of a polygon using standard or arbitrary units of measure.

27.4 Geometry - Number Pairs: Identifying number pairs on a number plane.

Example:



What is the number pair for point Q?

27.5 Geometry - Lines or Figures:

Recognizing and identifying common lines and plane figures. Includes angles, parallel and perpendicular lines, parallelograms, rectangles, squares, and right triangles. Does not include work with solid figures like spheres, rectangular prisms, etc.

---

28. VERBAL APPLICATION

28.1 Word Problems: All types of word problems including word problems with graphs. The coding of word problems is given priority over the specific computation required by the problems. Therefore, regardless of the computation, time on word problems is coded under word problems.

---

29. MATH RELATED

29.1 Money - Identifying coins, the sum of a set of coins, and equivalent values of coins.

29.2 Other Concepts: Other concepts and applications not covered by codes 20 through 28.

Examples:

- Volume
- Solid Figures
- Liquid or Weight Measures
- Statistics and Probability
- Constructing Line and Bar Graphs
- Set Theory, Set Diagrams, Logic
- Exponents (concepts of)
- Averages (concepts of)

---

30. MATH BELOW TEST LEVEL

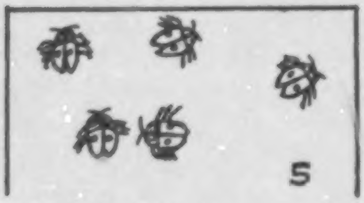
30.1 Developmental Activities - Activities which do not involve computation but do promote the development of concepts which are considered preliminary to the understanding and use of operational concepts. Includes:

A. Review of basic number concepts such as learning the number name for a set of objects less than 10, learning to count and write the numbers from 0 to 10, one to one matching and recognition of equivalent sets.

Examples:

three	▯ ▽ ○	3 3 3 3

How many?



B. Activities which provide experiences (most often with concrete materials) in recognizing likenesses and differences, sorting, ordering, comparing, and matching.

Examples:
- Attribute blocks or games
- Pattern blocks
- Tangrams
- Geoboards
- Geoblocks
- Soma cube puzzle

2.13. Content Summary: Other Academic

40. PHYSICAL/BIOLOGICAL SCIENCES

- Biology
- Physics
- Chemistry

41. SOCIAL SCIENCES

- Geography
- History
- Social Studies
- Current Events

42. FOREIGN LANGUAGE

- Spanish
- German
- French
- etc.

Other Academic Content Category Definitions

40. PHYSICAL/BIOLOGICAL SCIENCES--An activity primarily involved with knowing about matter, energy, plants and animals.

Examples: a. Physics, chemistry, geology, anatomy, meteorology, biology, astronomy.

---

41. SOCIAL SCIENCES--An activity primarily concerned with humans and their living together.

Examples:
- a. Social Studies,
- b. Geography (human),
- c. Sociology, pyschology,
- d. Current events, government, politics,
- e. History,
- f. Economics,
- g. Political science, law,
- h. Anthropology,
- j. Art history.

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42. FOREIGN LANGUAGE--An activity primarily involved with reading, writing, or conversing in other than the native tongue.

Examples:
- a. Spanish,
- b. French,
- c. Russian,
- d. Latin,
- e. Turkish,
- f. Hebrew ...

Note: If any math or reading is involved in these other academic activities, be sure to code the specific math or reading category in addition to the other academic category.

APPENDIX D

SAMPLE TEACHER PRINTOUT & DIRECTIONS

Dear

Your individual inservice conference is scheduled with ____________________ on ________, ___, at ___:___. He will meet you at your classroom. The conference should take between a half hour and 45 minutes.

Before your conference, please be sure to study the enclosed materials:

1) Teacher's Manual: Teaching Strategies for Increasing Academic Learning Time and Student Achievement,

2) Directions on interpreting the individual observational summary printouts.

3) Computer printouts summarizing baseline observations of you and your target student(s). There is one printout for each student observed. Write down any questions you have about these materials for the conference.

Thank you. See you at our conference.

INTERPRETING THE INDIVIDUAL
TEACHER OBSERVATIONAL DATA SUMMARIES

Introduction

Each teacher is provided with one data summary per target student (TS) whom she or he teaches. Each data summary contains descriptive information collected by an observer coding on the Academic Learning Time Observation System (ALTOS). Each data summary contains information from observations of you and your target student only. The data summary is provided on the enclosed four-page computer printout(s). The first page lists the dates of observation, teacher ID numbers and number of educational activities observed each day. The second page summarizes characteristics of the educational activities such as pacing, predominate target student activities, task success, instructor activities, etc. The third page summarizes the subject matter areas observed. Finally, the fourth page summarizes observed student engagement, non-engagement, types of instructor moves, and selected combinations of student-teacher behaviors.

PRINTOUT PAGE 1: Dates of Observation

DATE: Refers to the dates on which ALTOS observations occurred.

TEACHER ID: Identification number of the teacher observed on each date. In most cases this will be your teacher ID number, unless a substitute or student teacher was observed in your classroom that day.

NO. ACTIVITIES: Number of educational activities observed and coded that day.

PRINTOUT PAGE 2: Educational Activity Summary

The top part of this page provides general identification information and the rest provides descriptive information on educational activity characteristics.

STUDENT ID: Identification number assigned to the target student (TS) to whom this printout summary refers.

STUDENT NAME. First name and initial of TS's last name.

TEACHER ID: Your assigned ID number.

SCHOOL: School name or abbreviation.

NO. OF DAYS OBSERVED: Days on which you were observed with the TS.

NO. OF ACTIVITIES OBSERVED: Total number of educational activities TS was observed with you as the teacher. Note that an educational activity is defined as changing only when the subject matter or pacing changes. See below.

TOTAL TIME OBSERVED: In minutes.

AVERAGE CLASS SIZE: Average number of students present in your class during observations.

AVERAGE NO. OF STUDENTS IN SAME ACTIVITY: Doing exactly the same activity as the target student (TS).

For each of the following categories, four kinds of summary data are reported: frequency, percent frequency, time and percent time. 1) Frequency is the number of activities in which the category was predominate (e.g., mostly self-paced, mostly discussing, etc.). 2) Percent frequency is the frequency multiplied by 100 and divided by the total number of activities observed. 3) Time is the total time in minutes that the category was observed (by summing the durations of the activities in which the category was predominate). 4) Percent time is the time multiplied by 100 and divided by the total time. Note that the percentages may not add to 100 for a given classification (e.g., TS PACING) due to occasional missing data.

TS PACING: Coded as SELF-PACED if the target student worked mostly at his or her own pace during the activity (e.g., independent seatwork). If the pacing of the activity was mostly determined by someone or something else, it was coded as OTHER-PACED (e.g., typically this is group work).

TS ACTIVITY: Coded as ORAL READING, SILENT READING, RECITING, LISTENING, DISCUSSING, WRITING or OTHER, depending on which category was predominate during the activity observed.

TASK SUCCESS IN READING: Coded as HIGH, MEDIUM or LOW in reading related activities only. HIGH TASK SUCCESS refers to few or no target student errors on the task(s) required by the activity (i.e., TS mastery, does very well). LOW TASK SUCCESS refers to almost all TS errors on the task(s), or TS makes no attempt at task(s) or just guesses. MEDIUM TASK SUCCESS is target student performance which is not HIGH or LOW TASK SUCCESS.

TASK SUCCESS IN MATH: Same categories as for reading activities, only in math.

TASK SUCCESS TOTAL: Same categories as above, but results are given for all activities in which task success was coded, regardless of subject matter.

INSTRUCTOR: Predominate source of instruction of the target student during the activity (TEACHER, PEER TUTOR, ADULT AIDE, SELF-INSTRUCTIONAL MATERIALS, TEACHING MACHINE, or NO INSTRUCTOR). Note that NO INSTRUCTOR was coded only if there was no direct interaction with the target student during the entire activity by any of the other sources.

INSTRUCTOR ACTIVITY: Predominate instructor behavior during the activity. Coded as LECTURING, DISCUSSING, PROMPTING, MODELING/ DEMONSTRATING, TESTING, SUPERVISING or OTHER.

PRINTOUT PAGE 3: Activity Subject Matter Summary

The predominant content area of the activity was coded by one of the categories below. Note that if multiple content areas were observed as part of the same activity in reading or math, READING-RELATED or MATH-RELATED was coded.

READING: Coded as DECODING/PHONICS, WORD STRUCTURE, WORD MEANING, COMPREHENSION, READING PRACTICE, SPELLING, GRAMMAR, COMPOSITION/WRITING, READING RELATED-OTHER or READING BELOW TEST LEVEL.

MATH: Coded as ADDITION/SUBTRACTION--NO REGROUPING, ADDITION/SUBTRACTION--WITH REGROUPING, COMPUTATIONAL TRANSFER, PLACE VALUE/NUMERALS, MULTIPLICATION, DIVISION, FRACTIONS/DECIMALS, SPATIAL APPLICATION, WORD PROBLEMS, MATH RELATED-OTHER or MATH BELOW TEST LEVEL.

OTHER ACADEMIC: Coded as SCIENCE, SOCIAL STUDIES or FOREIGN LANGUAGE.

NON-ACADEMIC: Coded as ART, MUSIC, TECHNOLOGICAL ARTS, PHYSICAL EDUCATION, PERCEPTUAL DEVELOPMENT, MANAGEMENT/PROCEDURAL, RECREATION/BREAK, PERSONAL EXPERIENCES or OTHER.

Note that totals are also given for READING, MATH, OTHER ACADEMIC and NON-ACADEMIC.

PRINTOUT PAGE 4: Target Student and Instructor Behavior Summary

At one minute intervals during a reading or math activity the observer coded the target student behavior, instructor move, and focus of the move occurring at that moment. Three kinds of data are reported: time, percent time and time per day. 1) Time refers to the number of one minute intervals in which each category was observed. This is an estimate of the amount of time in minutes spent in that category. 2) Percent time is the time in minutes multiplied by 100 and divided by the total time observed in reading or math activities. 3) Time per day should be ignored, unless you have been observed for full days.

LEARNER MOVES (target student only)

ENGAGED WRITTEN: TS is overtly and non-orally attending to the substance of a reading or math task (e.g., writing, manipulating objects, using calculator, typing on computer).

ENGAGED ORAL: TS is overtly and orally attending to the substance of a reading/math task (e.g., asking or answering question, commenting, presenting oral report, reading aloud).

ENGAGED COVERT: TS is covertly attending to the substance of a reading/math task (e.g., listening, watching, "thinking").

ENGAGED WITH DIRECTIONS: TS is attending to the structure (goals) or directions of a math/reading task (mode of engagement not coded--e.g., listening to directions or reading directions are both coded the same).

TOTAL LEARNER ENGAGEMENT: Sum of engaged written, oral, covert and with directions.

NOT ENGAGED INTERIM: TS is not attending to the substance or directions of a math/ reading task, but is doing something peripheral to that task (e.g., sharpening pencil, passing in papers, finding supplies needed).

NOT ENGAGED WAIT: TS is not attending to the substance or directions of a math/reading task because s/he is waiting on someone or something else in order to continue the task (e.g., hand raised for teacher help, standing in line to get paper graded, interruption of class by special announcement on intercom).

NOT ENGAGED OFF-TASK: TS is not attending to the substance or directions of a math/reading task, nor not engaged interim, nor not engaged wait (e.g., talking to neighbor, arguing, fighting, daydreaming, staring out window, sleeping, wandering around room).

TOTAL LEARNER NON-ENGAGEMENT: Sum of not engaged interim, wait and off-task.

INSTRUCTOR MOVES (usually teacher, but could be peer, etc.)

NON-DIRECT INSTRUCTION: Instructor is not directly interacting with the target student or someone else in a group activity which includes TS. Note that the instructor could be working with students in another group activity which does not include TS, or with other individuals during seatwork.

ACADEMIC MONITORING: Instructor is directly observing how well TS (or someone else in the group including TS) is doing on a reading/math task but makes no other remarks (e.g., teacher looks over student's shoulder as s/he works, watches students work problems on board, listens to oral book report).

ACADEMIC FEEDBACK: Instructor informs TS or group including TS whether a student reading/math response is correct or incorrect. No additional explanation is provided (e.g., "That's right.", "No.", TS looks at instructor marks on test or worksheet, another student or the instructor reads aloud while TS reads the same text silently.)

ACADEMIC QUESTION: Instructor solicits a reading/math related response from TS or another student in the group which includes TS (e.g., "3 plus 5 equals?", "What is the capital of Indiana?", "Summarize the main points of the story.", instructor shows flash card and waits for a response).

EXPLANATION BASED ON STUDENT NEED: Instructor provides a statement concerning the substance of a math/reading tasks because one or more students are having difficulty or need immediate assistance. Statement is not about structure or directions of task (e.g., "The reason your answer was not right is that I think you forgot to borrow when you subtracted.", "The word 'anticipate' means ... (in response to student question)", "Everybody, listen. A number of you are having difficulty with these problems because you are not placing your decimal points in the right places. Remember, when you multiply decimals, the answer must have as many digits to the right of the decimal ...").

PLANNED EXPLANATION: Instructor provides a statement concerning the substance of a reading/math task. Statement is not about directions to or structure of task, nor in response to an immediate student need or difficulty with the task (e.g., lecturing, modeling, demonstrating, etc.). No student response is expected, other than attending to the explanation.

STRUCTURING/DIRECTING: Instructor structures or gives directions for a math/reading task. Does not involve the substance of the task itself (e.g., "Do the first 5 problems on page 22 in your math book.", "The reason we're doing this activity is so you will know if you receive the correct amount of change when you pay for something at the store.").

TASK ENGAGEMENT FEEDBACK: Instructor comments on student engagement or non-engagement, but not about the substance or directions of a reading/math task (e.g., "I'm glad to see you're working so hard.", "Pay attention.", "Quiet, get back to work ...", etc.).

TOTAL DIRECT INSTRUCTION: Sum of academic monitoring, feedback, questioning, explanation based on need, planned explanation, structuring/directing and task engagement feedback.

FOCUS OF INSTRUCTOR MOVE

TARGET STUDENT: Instructor move is directed specifically to the target student.

GROUP: Instructor move is directed to someone other than the target student in the group which includes TS, or to the group as a whole.

JOINT LEARNER X INSTRUCTOR MOVES

TS ENGAGEMENT DURING NON-DIRECT INSTRUCTION: No direct instruction is being provided to TS or someone in a group which includes TS, and TS is engaged in the reading/math task (written, oral, covert or with directions).

TS NON-ENGAGEMENT DURING NON-DIRECT INSTRUCTION: No direct instruction is being provided to TS or someone in a group which includes TS, and TS is not engaged in the reading/math task (interim, wait or off-task).

TS ENGAGEMENT DURING DIRECT INSTRUCTION: Direct instruction is being provided to TS or someone in a group which includes TS (e.g., academic feedback, questioning, etc.), and TS is engaged in the reading/math task.

TS NON-ENGAGEMENT DURING DIRECT INSTRUCTION: Direct instruction is being provided to TS or someone in a group which includes TS, and TS is not engaged in the reading/math task.

IMPORTANT INSTRUCTOR MOVES

ACADEMIC FEEDBACK TO TS: Instructor is giving academic feedback specifically to the target student.

ACADEMIC FEEDBACK TO GROUP: Instructor is giving academic feedback to someone else in the group activity which includes TS, or to the group as a whole.

PLANNED EXPLANATION TO GROUP: Instructor is giving a planned explanation to someone else in the group activity which includes TS, or to the group as a whole.

STRUCTURING/DIRECTING OF GROUP: Instructor is providing directions or structuring the task for someone else in the group activity which includes TS, or to the group as a whole.

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    ACADEMIC LEARNING TIME -- TEACHER DATA SUMMARY -- 2ND SEMESTER 1982-83

    DATES OF OBSERVATION

DATE: FEB 15, 1983           TEACHER ID: 440    NO. ACTIVITIES:   2
DATE: FEB 17, 1983           TEACHER ID: 440    NO. ACTIVITIES:   2
DATE: FEB 21, 1983           TEACHER ID: 440    NO. ACTIVITIES:   2
DATE: FEB 24, 1983           TEACHER ID: 440    NO. ACTIVITIES:   2
DATE: FEB 28, 1983           TEACHER ID: 440    NO. ACTIVITIES:   3
DATE: MAR  3, 1983           TEACHER ID: 440    NO. ACTIVITIES:   3
DATE: MAR 10, 1983           TEACHER ID: 440    NO. ACTIVITIES:   1
```

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ACADEMIC LEARNING TIME -- TEACHER DATA SUMMARY -- 2ND SEMESTER 1982-83

STUDENT ID: 45      STUDENT NAME:  MIKE C          TEACHER ID:   440
SCHOOL:  ELLETTSVL.      NO. OF DAYS OBSERVED:   7
NO. OF ACTIVITIES OBSERVED:  15     TOTAL TIME OBSERVED (MIN.):  330
AVERAGE CLASS SIZE:  13.5    AVERAGE NO. OF STUDENTS IN SAME ACTIVITY:  13.5

                          EDUCATIONAL ACTIVITY SUMMARY
                                   FREQUENCY     PERCENT          TIME        PERCENT
                                     (NO.)      FREQUENCY       (MIN.S)        TIME
                                   ---------    ---------      ---------     -------
TS PACING:            SELF-PACED         6.0         40.0          121.0        36.7
TS PACING:           OTHER-PACED         9.0         60.0          209.0        63.3

TS ACTIVITY:        ORAL READING         1.0          6.7            2.0         0.6
TS ACTIVITY:      SILENT READING         3.0         20.0           85.0        25.8
TS ACTIVITY:            RECITING         0.0          0.0            0.0         0.0
TS ACTIVITY:           LISTENING         7.0         46.7          160.0        48.5
TS ACTIVITY:          DISCUSSING         0.0          0.0            0.0         0.0
TS ACTIVITY:             WRITING         3.0         20.0           45.0        13.6
TS ACTIVITY:               OTHER         1.0          6.7           38.0        11.5

TASK SUCCESS READING:       HIGH         5.0         33.3          140.0        42.4
TASK SUCCESS READING:     MEDIUM         3.0         20.0           68.0        20.6
TASK SUCCESS READING:        LOW         1.0          6.7           16.0         4.8

TASK SUCCESS MATH:          HIGH         0.0          0.0            0.0         0.0
TASK SUCCESS MATH:        MEDIUM         0.0          0.0            0.0         0.0
TASK SUCCESS MATH:           LOW         0.0          0.0            0.0         0.0

TASK SUCCESS TOTAL:         HIGH         7.0         46.7          159.0        48.2
TASK SUCCESS TOTAL:       MEDIUM         3.0         20.0           68.0        20.6
TASK SUCCESS TOTAL:          LOW         1.0          6.7           16.0         4.8

INSTRUCTOR:              TEACHER        15.0        100.0          330.0       100.0
INSTRUCTOR:           PEER TUTOR         0.0          0.0            0.0         0.0
INSTRUCTOR:           ADULT AIDE         0.0          0.0            0.0         0.0
INSTRUCTOR:   SELF-INSTR. MAT.           0.0          0.0            0.0         0.0
INSTRUCTOR:  TEACHING MACHINE            0.0          0.0            0.0         0.0
INSTRUCTOR:      NO INSTRUCTOR           0.0          0.0            0.0         0.0

INST. ACTIVITY:       LECTURING          1.0          6.7           13.0         3.9
INST. ACTIVITY:      DISCUSSING          0.0          0.0            0.0         0.0
INST. ACTIVITY:       PROMPTING          8.0         53.3          206.0        62.4
INST. ACTIVITY:      MODEL/DEMO          0.0          0.0            0.0         0.0
INST. ACTIVITY:         TESTING          0.0          0.0            0.0         0.0
INST. ACTIVITY:     SUPERVISING          6.0         40.0          111.0        33.6
INST. ACTIVITY:           OTHER          0.0          0.0            0.0         0.0
```

ACADEMIC LEARNING TIME -- TEACHER DATA SUMMARY -- 2ND SEMESTER 1982-83

ACTIVITY SUBJECT MATTER SUMMARY

	FREQUENCY (NO.)	PERCENT FREQUENCY	TIME (MIN.S)	PERCENT TIME
READING: DECODING/PHONICS	2.0	13.3	20.0	6.1
READING: WORD STRUCTURE	0.0	0.0	0.0	0.0
READING: WORD MEANING	1.0	6.7	16.0	4.8
READING: COMPREHENSION	1.0	6.7	55.0	16.7
READING: READING PRACTICE	5.0	33.3	124.0	37.6
READING: SPELLING	0.0	0.0	0.0	0.0
READING: GRAMMAR	0.0	0.0	0.0	0.0
READING: COMPOSITION/WRITING	0.0	0.0	0.0	0.0
READING: RDG. RELATED- OTHER	4.0	26.7	96.0	29.1
READING: RDG. BELOW TEST LVL	0.0	0.0	0.0	0.0
TOTAL READING	13.0	86.7	311.0	94.2
MATH: ADD/SUBTRACT-NO REGRP.	0.0	0.0	0.0	0.0
MATH: ADD/SUBTRACT-W/ REGRP.	0.0	0.0	0.0	0.0
MATH: COMPUTATIONAL TRANSFER	0.0	0.0	0.0	0.0
MATH: PLACE VALUE/NUMERALS	0.0	0.0	0.0	0.0
MATH: MULTIPLICATION	0.0	0.0	0.0	0.0
MATH: DIVISION	0.0	0.0	0.0	0.0
MATH: FRACTIONS/DECIMALS	0.0	0.0	0.0	0.0
MATH: SPATIAL APPLICATION	0.0	0.0	0.0	0.0
MATH: WORD PROBLEMS	0.0	0.0	0.0	0.0
MATH: MATH RELATED - OTHER	0.0	0.0	0.0	0.0
MATH: MATH BELOW TEST LEVEL	0.0	0.0	0.0	0.0
TOTAL MATH	0.0	0.0	0.0	0.0
OTHER ACADEMIC: SCIENCE	0.0	0.0	0.0	0.0
OTHER ACADEMIC: SOCIAL STUD.	0.0	0.0	0.0	0.0
OTHER ACADEMIC: FOREIGN LAN.	0.0	0.0	0.0	0.0
TOTAL OTHER ACADEMIC	0.0	0.0	0.0	0.0
NON-ACADEMIC: ART	0.0	0.0	0.0	0.0
NON-ACADEMIC: MUSIC	0.0	0.0	0.0	0.0
NON-ACADEMIC: TECHNOLOG. ART	0.0	0.0	0.0	0.0
NON-ACADEMIC: PHYSICAL EDUC.	0.0	0.0	0.0	0.0
NON-ACADEMIC: PERCEPTUAL DEV	0.0	0.0	0.0	0.0
NON-ACADEMIC: MANAGMT/PROCD.	0.0	0.0	0.0	0.0
NON-ACADEMIC: RECREATION/BRK	0.0	0.0	0.0	0.0
NON-ACADEMIC: PERSONAL EXPER	0.0	0.0	0.0	0.0
NON-ACADEMIC: OTHER	2.0	13.3	19.0	5.8
TOTAL NON-ACADEMIC	2.0	13.3	19.0	5.8

ACADEMIC LEARNING TIME -- TEACHER DATA SUMMARY -- 2ND SEMESTER 1982-83

TARGET STUDENT _ INSTRUCTOR BEHAVIOR SUMMARY

	TIME (MIN.S)	PERCENT TIME	TIME/DAY (MIN.S)
LEARNER: ENGAGED WRITTEN	33.0	10.2	4.7
LEARNER: ENGAGED ORAL	17.0	5.3	2.4
LEARNER: ENGAGED COVERT	166.0	51.4	23.7
LEARNER: ENGAGED DIRECTIONS	40.0	12.4	5.7
TOTAL LEARNER ENGAGEMENT	256.0	79.3	35.5
LEARNER: NOT ENGAGED INTERIM	7.0	2.2	1.0
LEARNER: NOT ENGAGED WAIT	23.0	7.1	3.3
LEARNER: NOT ENGAGED OFFTASK	37.0	11.5	5.3
TOTAL LEARNER NON-ENGAGEMENT	67.0	20.7	9.6
INSTR: NON-DIRECT INSTRUCT.	141.0	43.7	20.1
INSTR: ACADEMIC MONITORING	4.0	1.2	0.6
INSTR: ACADEMIC FEEDBACK	77.0	23.8	11.0
INSTR: ACADEMIC QUESTION	40.0	12.4	5.7
INSTR: EXPLANATION - NEED	14.0	4.3	2.0
INSTR: EXPLANATION - PLANNED	7.0	2.2	1.0
INSTR: STRUCTURING/DIRECTING	38.0	11.8	5.4
INSTR: TASK ENGAGMT FEEDBACK	2.0	0.6	0.3
INSTR: TOTAL DIRECT INSTR.	182.0	56.3	25.0
FOCUS: TARGET STUDENT	29.0	9.0	4.1
FOCUS: GROUP	153.0	47.4	21.9
JOINT LEARNER X INSTRUCTOR MOVES:			
ENGAGED NON-DIRECT INSTR.	76.0	23.5	10.9
NOT ENGAGED NON-DIRECT INST.	65.0	20.1	9.3
ENGAGED DIRECT INSTRUCTION	180.0	55.7	25.7
NOT ENGAGED DIRECT INSTRUCT.	2.0	0.6	0.3
IMPORTANT INSTRUCTOR MOVES:			
ACADEMIC FEEDBACK TO TS	12.0	3.7	1.7
ACADEMIC FEEDBACK TO GROUP	65.0	20.1	9.3
PLANNED EXPLANATION TO GROUP	7.0	2.2	1.0
STRUCTURING/DIRECTING -GROUP	34.0	10.5	4.9

APPENDIX E

SOURCE LISTING OF BASIC PROGRAMS

PROGRAM LOGCODE

```
10 CLEAR 2500
20 DEF FN UL%(A$)=VAL(LEFT$(STR$(VAL(A$)),LEN(STR$(VAL(A$)))-2))
30 DEF FN UR%(A$)=VAL(RIGHT$(A$,2))
40 DEF FN P%(L%,R%)=100*ABS(L%)+ABS(R%)
50 DEF FN SL%(L%)=INT(L%/100)
60 DEF FN SR%(R%)=R%-(INT(R%/100))*100:GOTO1480
70 LPRINT" *** ERROR *** SEE SCREEN MESSAGE":RETURN
80 PRINT:PRINT" **** ";A$;" IS AN INVALID ENTRY **** -- RE-ENTER --":GOSUB70   :
RETURN
90 PRINTUSING"##/##";FNSL%(D%);FNSR%(D%);:RETURN:'PRINT DATE MM/DD
100 A$=NU$:PRINT:INPUT" MAKE ANY CHANGES (Y/N)";A$:A$=LEFT$(A$,1):RETURN
110 GOSUB90   :PRINT C%;"=";C$(C%);TAB(43);:PRINT USING "##:##";FNSL%(TB%);FNSR%
(TB%);:PRINTTAB(49);TA%;"'";TAB(56);S%;"=";S$(S%):RETURN
120 LPRINT USING "###";AN%;:LPRINTTAB(5); C%;"=";C$(C%);TAB(43);:LPRINT USING "#
#:##";FNSL%(TB%);FNSR%(TB%);:LPRINT TAB(49);TA%;"'";TAB(56);S%;"=";S$(S%):RETURN
130 LPRINT NU$;CR$:LPRINT USING "DATE: ##/##";FNSL%(D%);FNSR%(D%);:LPRINTTAB(43)
"TIME";TAB(49)"TIME";TAB(56)"TASK":LPRINT" NO.";TAB(6);"ACADEMIC SUBJECT";TAB(43
);"BEGUN";TAB(49)"SPENT";TAB(56)"SUCCESS";CR$:RETURN
140 PRINTTAB(12);:INPUT " PRESS <ENTER> KEY TO CONTINUE ...";A$:RETURN
150 IF ID%=MD% OR D%=MD% OR SC%=MD% OR TB%=MD% OR TA%=MD% THEN PRINT"**** ACTIVI
TY NOT SAVED DUE TO MISSING DATA ****":RETURN
160 DA%(AN%,1)=ID%:DA%(AN%,2)=D%:DA%(AN%,3)=SC%:DA%(AN%,4)=TB%:DA%(AN%,5)=TA%:GO
SUB110  :RETURN
170 SC%=FNP%(S%,C%):TA%=EM%-BM%:RETURN:'PACK ACT.DATA
180 ID%=DA%(AN%,1):SI%=FNSR%(ID%):TI%=FNSL%(ID%)
190 D%=DA%(AN%,2):C%=FNSR%(DA%(AN%,3)):S%=FNSL%(DA%(AN%,3)):TB%=DA%(AN%,4):TA%=D
A%(AN%,5):RETURN
200 A$=NU$:INPUT" (OR . TO EXIT)";A$:RETURN
210 CLS:PRINT:PRINT" **** NO DATA FILE LABELED **** CAN'T CONTINUE":PRINT" UNLES
S YOU RETRIEVE OLD FILE OR LABEL NEW ONE":GOSUB140  :RETURN
220 CLS:PRINT:PRINT" **** STUDENT OR TEACHER ID NEEDED TO CONTINUE ****":GOSUB14
0  :GOSUB1770 :RETURN
230 PRINT:PRINT" ENTER DATE (MMDD)";:GOSUB200  :IF A$=P$ THEN RETURN
240 M%=FNUL%(A$):D%=FNUR%(A$):IFM%<1ORM%>12THEN250  ELSE IF D%<1ORD%>MO%(M%)THEN
250  ELSE D%=FNP%(M%,D%):PRINT" DATE = ";:GOSUB90   :RETURN
250 D%=MD%:GOSUB80   :RETURN
260 'INSERT ACTIVITY DATA
270 FOR AN%=NA%+1 TO MA%:GOSUB420  :IF A$=P$ THEN RETURN ELSE NA%=AN%
280 GOSUB150  :NEXTAN%:RETURN
290 'INCREMENT DATE
300 M%=FNSL%(D%):D%=FNSR%(D%):IF MO%(M%)=D% THEN D%=0:M%=M%+1
310 IF M%>12 THEN M%=1:YR%=YR%+1
320 D%=D%+1:D%=FNP%(M%,D%):RETURN
330 'CHECK TIME IN A$ AND CONVERT TO MIN'S AND 24 HR CLOCK
340 T%=0:TM%=0:IF LEN(A$)>4 THEN RETURN
350 H%=FNUL%(A$):M%=FNUR%(A$):IF H%<1 OR H%>23 OR M%<0 OR M%>59 THEN GOSUB80   :
RETURN
360 IF H%<6 THEN H%=H%+12
370 TM%=60*H%+M%:T%=FNP%(H%,M%):RETURN
380 'CHECK TASK SUCCESS
390 S%=VAL(A$):IF(S%>0 AND S%<4)OR A$="0" THEN RETURN ELSE S%=-1:GOSUB80   :RETU
RN
400 'CHECK CONTENT (SUBJECT)
410 C%=VAL(A$):IF(C%>9 AND C%<31)OR(C%>39 AND C%<44)THEN RETURN ELSE C%=MD%:GOSU
B80   :RETURN
420 PRINT:PRINT" ENTER ACTIVITY DATA ON ";:GOSUB90   :PRINT:C%=MD%:S%=MD%:SC%=MD
%:TB%=MD%:TE%=MD%:TA%=MD%:BM%=0:EM%=0
```

```
430 PRINT" SUBJECT CODE";:GOSUB200  :IFA$=P$THEN RETURN ELSE GOSUB400  :IF C%=MD
% THEN430
440 PRINT" TIME STARTED";:GOSUB200  :IFA$=P$THEN RETURN ELSE GOSUB330  :IF T%=0
THENGOSUB80   :GOTO440  ELSE TB%=T%:BM%=TM%
450 PRINT" TIME STOPPED";:GOSUB200  :IFA$=P$THEN RETURN ELSE GOSUB330  :IF T%=0
THENGOSUB80   :GOTO450  ELSE TE%=T%:EM%=TM%:IF EM%-BM%<=0 THENPRINT: PRINT" TIME
 STOPPED";TE%;" NOT GREATER THAN TIME STARTED";TP%:GOSUB80   :GOTO450
460 PRINT" TASK SUCCESS (1=HI, 2=MED, 3=LO, 0=MISSING)";:GOSUB200  :IF A$=P$ THE
N RETURN ELSE GOSUB380  :IF S%=-1 THEN 460
470 GOSUB170  :RETURN
480 'FIND ACTIVITY
490 PRINT:PRINT" TIME STARTED OF ACTIVITY TO MODIFY ON ";:GOSUB90   :PRINT:GOSUB
200  :IF A$=P$ THEN RETURN ELSE GOSUB 330  :IF T%=0 THEN 490
500 FOR AN%=NA% TO 1 STEP -1:IF (DA%(AN%,4)=T%)AND(DA%(AN%,2)=D%) THEN RETURN
510 NEXT AN%:CLS:PRINT:PRINT" *** TIME ";A$;" NOT FOUND ***":GOTO490
520 'CHANGE ACTIVITY
530 GOSUB480  :IF A$=P$ THEN RETURN ELSE GOSUB180  :PRINT:PRINT" ACTIVITY TO CHA
NGE:":PRINT:GOSUB110  :PRINT:PRINT" -- RE-ENTER ENTIRE ACTIVITY":PRINT:GOSUB420
 :IF A$=P$ THEN 530  ELSE GOSUB150  :GOTO530
540 'DELETE AN ACTIVITY
550 GOSUB480  :IF A$=P$ THEN RETURN ELSE GOSUB180  :PRINT:PRINT" ACTIVITY TO DEL
ETE:":PRINT:GOSUB110  :PRINT:PRINT" SHALL I DELETE IT FROM MEMORY (Y/N)?":GOSUB2
00  :IF A$<>"Y" THEN 550  ELSE  CLS:PRINT:PRINT" DELETING ACTIVITY ... ONE MOMEN
T PLEASE ..."
560 IF AN%=NA% THEN 580
570 FOR J=AN% TO NA%-1:FOR K=1 TO 5:DA%(J,K)=DA%(J+1,K):NEXT K:NEXT J
580 FOR K=1 TO 5:DA%(NA%,K)=MD%:NEXTK:NA%=NA%-1:GOTO550
590 'CHANGE DATE
600 CLS:PRINT:PRINT" DAY TO MODIFY: ":GOSUB230  :IF A$=P$ THEN RETURN ELSE IF D%
=MD% THEN 600  ELSE GOSUB100  :IF A$="Y" THEN 600  ELSE RETURN
610 'MAKE CHANGES PERMANENT
620 PRINT:PRINT" DO YOU WANT THESE CHANGES TO BE MADE PERMANENT":PRINT" -- I.E.,
 SAVED ON DISK (Y/N)?":GOSUB200  :IF A$<>"Y" THEN RETURN ELSE GOSUB1020 :RETURN
630 'MODIFY LOG BOOKLET
640 IF DF$="NONE" THEN GOSUB210  :RETURN
650 IF ID%=MD% THEN GOSUB220
660 CLS:PRINT:PRINT"    MODIFY LOG BOOKLET ACTIVITIES":PRINT
670 PRINT" CD = CHANGE DATE OF DAY TO MODIFY IF NOT ";:GOSUB90   :PRINT
680 PRINT" IA = INSERT ACTIVITY ON ";:GOSUB90   :PRINT
690 PRINT" CA = CHANGE ACTIVITY ON ";:GOSUB90   :PRINT
700 PRINT" DA = DELETE ACTIVITY ON ";:GOSUB90   :PRINT
710 PRINT:PRINT" ENTER CHOICE";:GOSUB200  :IF A$=P$ THEN GOSUB 610  :RETURN
720 IF A$="CD" THEN GOSUB 590  ELSE IF A$="IA" THEN GOSUB 260  ELSE IF A$="CA" T
HEN GOSUB 520  ELSE IF A$="DA" THEN GOSUB 540  ELSE GOSUB80
730 GOTO 660
740 'INSERT LOG BOOKLET (A WEEK)
750 IF DF$="NONE"THEN GOSUB210  :RETURN
760 IF ID%=MD% THEN GOSUB 220
770 IF NA%>=MA% THEN PRINT" DATA FILE FULL -- NO MORE DATA CAN BE INSERTED":GOSU
B140  :RETURN
780 CLS:PRINT:PRINT" INSERT NEW LOGBOOK DATA":PRINT:PRINT" DATE AT  B E G I N N
I N G  OF WEEK":GOSUB230  :IF A$=P$ THEN RETURN ELSE IF D%=MD% THEN 780  ELSE GO
SUB100  :IF A$="Y" THEN 780
790 FOR DW%=0TO4:CLS:PRINT:PRINT" DAY IS ";DW$(DW%);" - ";:GOSUB90   :PRINT:GOSU
B260  :GOSUB100  :IF A$="Y"THEN CLS:PRINT:PRINT:GOSUB680
800 GOSUB290  :NEXTDW%:GOSUB1020 :GOTO780
810 'LIST DATA TO PRINTER
```

```
820 GOSUB920  :IF NA%=0 THEN RETURN
830 T%=MD%:FOR AN%=1 TO NA%:GOSUB190  :IF D%<>T% THEN GOSUB 130
840 GOSUB120  :T%=D%:NEXTAN%:RETURN
850 'PRINT DATA FILE HEADER
860 CLS:PRINT:PRINTTAB(12);"ALT TEACHER LOG DATA":PRINT:PRINT
870 PRINT" DATA FILE NAME: ";DF$
880 PRINT" STUDENT NAME: ";SN$;"  ID# =";SI%
890 PRINT" TEACHER NAME: ";TN$;"  ID# =";TI%
900 PRINT" SCHOOL: ";SC$
910 PRINT" YEAR:";YR%;" -- nO. OF ACTIVITIES:";NA%:PRINT:PRINT:GOSUB140  :RETURN
920 LPRINT CHR$(12):POKE&HFC05,0:LPRINTCR$,CR$
930 LPRINT TAB(10);" ALT TEACHER LOG DATA":LPRINT CR$,CR$
940 LPRINT" DATA FILE NAME: ";DF$
950 LPRINT" STUDENT NAME: ";SN$;"  ID#=";FNSR%(ID%)
960 LPRINT" TEACHER NAME: ";TN$;"  ID#=";FNSL%(ID%)
970 LPRINT" SCHOOL: ";SC$
980 LPRINT" YEAR:";YR%;" -- NO. OF ACTIVITIES:";NA%:LPRINT CR$,CR$:RETURN
990 'LIST DATA TO SCREEN
1000 GOSUB850  :FOR J=1TO NA% STEP14:FOR AN%=J TO J+13:IF AN%>NA% THEN GOSUB140
 :RETURN
1010 GOSUB190  :GOSUB110  :NEXTAN%:GOSUB140  :NEXTJ:RETURN
1020 'WRITE DF$ TO DISK
1030 CLS:PRINT:PRINT" NOW SAVING ";DF$;" ON DISK ..."
1040 OPEN"O",1,DF$:PRINT#1,DF$:PRINT#1,CF$:PRINT#1,SN$:PRINT#1,TN$:PRINT#1,SC$:P
RINT#1,YR%:PRINT#1,NA%:PRINT#1,SI%:PRINT#1,TI%:PRINT#1,ID%
1050 IF NA%=0 THEN 1070
1060 FOR J=1 TO NA%:FOR K=1 TO 5:PRINT#1,DA%(J,K):NEXTK:NEXTJ
1070 CLOSE:RETURN
1080 'READ DF$ FROM DISK
1090 CLS:PRINT:PRINT" NOW READING ";DF$;" FROM DISK ..."
1100 ON ERROR GOTO 1150 :OPEN "I",1,DF$:INPUT#1,A$:INPUT#1,B$:IF A$<>DF$ THEN PR
INT" *** INVALID ALT LOG FILE ***":GOSUB140  :GOTO1140
1110 CF$=B$:INPUT#1,SN$:INPUT#1,TN$:INPUT#1,SC$:INPUT#1,YR%:INPUT#1,NA%:INPUT#1,
SI%:INPUT#1,TI%:INPUT#1,ID%:IF NA%=0 THEN 1140
1120 FOR J=1 TO NA%:FOR K=1 TO 5:IF EOF(1) THEN 1160
1130 INPUT#1, DA%(J,K):NEXTK:NEXTJ
1140 CLOSE:ON ERROR GOTO 1450 :RETURN
1150 ON ERROR GOTO 1450 :IF ERR/2<>53 THEN 1450  ELSE CLS:PRINT" *** FILE NOT FO
UND ***":GOSUB140  :RESUME 1140
1160 CLS:PRINT" EOF IN DATA FILE UNEXPECTED -- SEE TED!":GOSUB140  :GOTO1140
1170 'FIND A DF
1180 GOSUB 1250
1190 GOSUB1340 :PRINT:PRINT" WHAT IS THE NAME OF THE DATA FILE YOU WANT TO RETRI
EVE?":GOSUB200  :IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$=NU$ THEN 1190
1200 FOR J=1 TO FC%:IF A$=FL$(J) THEN 1220
1210 NEXTJ:PRINT" FILE NOT FOUND IN CATALOG":GOSUB140  :GOTO1190
1220 DF$=A$:GOSUB 1080 :RETURN
1230 'DELETE A DF
1240 PRINT" HERE IS WHERE DELETE GOES":GOSUB140  :RETURN
1250 'READ FILELIST
1260 ON ERROR GOTO 1290 :FC%=0:OPEN"I",1,"FILELIST":FOR J=1 TO MF%:IF EOF(1) THE
N 1280
1270 INPUT#1,FL$(J):FC%=FC%+1:NEXTJ
1280 CLOSE:ON ERROR GOTO 1450 :RETURN
1290 ON ERROR GOTO 1450 :IF ERR/2<>53 THEN 1450  ELSE PRINT" FILELIST NOT FOUND"
:RESUME 1280
1300 'WRITE FILELIST TO DISK
```

```
1310 OPEN"O",1,"FILELIST":FOR J=1 TO FC%:IF FL$(J)="0" THEN 1330
1320 PRINT#1,FL$(J)
1330 NEXTJ:CLOSE:RETURN
1340  PRINT FILELIST
1350 CLS:PRINT" TOTAL # OF FILES =";FC%:PRINT:PRINT" CATALOG OF EXISTING OBSERVA
TION SYSTEM/DATA FILES:":PRINT
1360 FOR J=1 TO FC% STEP24:FOR I=J TO J+23 STEP4:PRINTFL$(I),FL$(I+1),FL$(I+2),F
L$(I+3):NEXTI:PRINT:GOSUB140  :NEXTJ:RETURN
1370 'USE AUX. PRINTER
1380 CLS:PRINT:PRINT" IS THE AUXILLIARY PRINTER HOOKED UP TO THE RS-232 AND POWE
R ON?":GOSUB200  :IF LEFT$(A$,1)<>"Y" THEN RETURN
1390 POKE &HFC00,72
1400 POKE &HFC01,60:POKE &HFC02,6:POKE &HFC04,0:POKE &HFC05,0:POKE &HFC06,0:POKE
 &HFC07,0:POKE 16421,2:POKE 16422,9:POKE 16423,252
1410 PRINT:PRINT" CHECK THE AUXILLIARY PRINTER FOR A MESSAGE...":LPRINT" *** AUX
ILLIARY PRINTER READY ***":LPRINT CHR$(12)
1420 RETURN
1430 'PRINT DA%
1440 FOR J=1 TO NA%:FOR K=1 TO 5:PRINTDA%(J,K);:NEXTK:PRINT:GOSUB140  :NEXTJ:RET
URN
1450 CLOSE:PRINT"ERROR#";((ERR/2)+1);" AT";ERL:PRINT"(SUB 1 IF>49)"
1460 IF ERR/2=61 THEN PRINT" *** WARNING *** THIS ERROR MEANS THAT YOUR DISK IS
FULL.":PRINT" YOU CANNOT CREATE ANY MORE FILES ON THIS DISK.":PRINT" YOU CAN, HO
WEVER, MODIFY EXISTING ONES.":END
1470 END
1480 ON ERROR GOTO 1450 :CF$="NONE":DF$="NONE"
1490 MF%=48:P$=".":MA%=750:CR$=CHR$(13):NU$=" ":MV%=0::AN%=0:NA%=0:YR%=1981:DIM
DA%(MA%,5),FL$(MF%)
1500 DEFINT I-N
1510 DIM CH$(8):FORJ=1TO8:READCH$(J):NEXTJ
1520 DATA LDF,ILB,MLB,MDH,RDF,LDP,LDS,AUX
1530 DIM DW$(4):FORJ=0TO4:READDW$(J):NEXTJ
1540 DATA MONDAY,TUESDAY,WEDNESDAY,THURSDAY,FRIDAY
1550 DIM MO%(12):FORJ=1TO12:READMO%(J):NEXTJ
1560 DATA 31,28,31,30,31,30,31,31,30,31,30,31
1570 DIMC$(43):FORJ=10TO30:READC$(J):NEXTJ
1580 DATA DECODING/PHONICS,WORD STRUCTURE,WORD MEANING, COMPREHENSION, READING P
RACTICE,SPELLING, GRAMMAR, COMPOSITION (CREATIVE WRITING),READING RELATED--OTHER
, READING BELOW TEST LEVEL (COPY)
1590 DATA ADD/SUBTRACT (NO REGROUPING),ADD/SUBTRACT (REGROUPING), COMPUTATIONAL
TRANSFER, PLACE VALUE/NUMERALS, MULTIPLICATION,DIVISION, FRACTIONS/DECIMALS, SPA
TIAL APPLICATION, VERBAL APPLICATION (WORD PROB.),MATH RELATED--OTHER
1600 DATA MATH BELOW TEST LEVEL
1610 FOR J=40 TO 43:READ C$(J):NEXTJ
1620 DATA SCIENCE, SOCIAL STUDIES, FOREIGN LANGUAGE, OTHER ACADEMIC
1630 DIM S$(3):S$(1)="HI":S$(2)="MED":S$(3)="LO":S$(0)="MSG"
1640 'REM MAIN CHOICE LIST
1650 GOSUB850  :CLS:PRINT:PRINT" PROGRAM LOGCODE -- MAIN CHOICE LIST":PRINT
1660 PRINTCH$(1);" = LABEL A NEW DATA FILE (NEW STUDENT)"
1670 PRINTCH$(2);" = INSERT LOG BOOKLET(S)"
1680 PRINTCH$(3);" = MODIFY LOG BOOKLET"
1690 PRINTCH$(4);" = MODIFY DATA FILE HEADER INFO"
1700 PRINTCH$(5);" = RETRIEVE DATA FILE FROM DISK STORAGE"
1710 PRINTCH$(6);" = LIST DATA FILE TO PRINTER"
1720 PRINTCH$(7);" = LIST DATA FILE TO SCREEN"
1730 PRINTCH$(8);" = SET UP AUXILLIARY PRINTER (HEATH OR DECWRITER)":PRINT
1740 PRINT" ENTER CHOICE";:GOSUB200  :IF A$=P$ THEN PRINT:PRINT" EXIT PROGRAM LO
```

```
GCODE AND RETURN TO BASIC":END
1750 FOR L=1 TO 8:IF A$=CH$(L) THEN ON L GOSUB 1970 ,740  ,630  ,1770 ,1170 ,810
  ,990  ,1370 :GOTO1640
1760 NEXTL:GOSUB80   :GOTO1640
1770 'MODIFY DF HEADER
1780 IF DF$="NONE" THEN GOSUB210  :RETURN
1790 CLS:PRINT:PRINT"   INSERT/MODIFY DATA FILE HEADER":PRINT
1800 PRINT" SN = STUDENT NAME AND ID#"
1810 PRINT" TN = TEACHER NAME AND ID#"
1820 PRINT" SC = SCHOOL NAME"
1830 PRINT"  L = LIST HEADER INFO":PRINT
1840 PRINT" ENTER CHOICE";:GOSUB200  :IF A$=P$ THEN GOSUB 1920 :RETURN
1850 IF A$="SN" THEN GOSUB 1870  ELSE IF A$="TN" THEN GOSUB 1890  ELSE IF A$="SC
" THEN GOSUB 1910  ELSE IF A$="L" THEN GOSUB 850  ELSE GOSUB80
1860 GOTO1790
1870 PRINT:PRINT" ENTER STUDENT NAME";:GOSUB200  :SN$=A$
1880 PRINT:PRINT" ENTER STUDENT ID#";:GOSUB200  :SI%=VAL(A$):RETURN
1890 PRINT:PRINT" ENTER TEACHER NAME";:GOSUB200  :TN$=A$
1900 PRINT:PRINT" ENTER TEACHER ID#";:GOSUB200  :TI%=VAL(A$):RETURN
1910 PRINT:PRINT" ENTER SCHOOL NAME";:GOSUB200  :SC$=A$:RETURN
1920 'CHECK ID'S, PACK, AND UPDATE ANY EXISTING RECORDS
1930 IF SI%<1 OR SI%>99 THEN PRINT:PRINTSI%;" IS INVALID STUDENT ID# -- RE-ENTER
":GOSUB1880 :GOTO1930
1940 IF TI%<1 OR TI%>326 THEN PRINT:PRINTTI%;" IS INVALID TEACHER ID# -- RE-ENTE
R":GOSUB1900 :GOTO 1940
1950 ID%=FNP%(TI%,SI%):IF ID%<>DA%(1,1) THEN FOR J=1 TO NA%:DA%(J,1)=ID%:NEXTJ
1960 RETURN
1970 REM-TO LABEL A NEW DATA FILE XXXXX.YYYYYY
1980 GOSUB1250
1990 CLS:PRINT:PRINT" INSTRUCTIONS ON LABELING":PRINT" -----------------------"
:PRINT
2000 PRINT" A DATA FILE NEEDS A UNIQUE LABEL IN ORDER TO IDENTIFY":PRINT" IT FOR
 SUBSEQUENT USE.  THE LABEL, OR NAME, HAS TWO PARTS":PRINT" SEPARATED BY A PERIO
D.":PRINT
2010 PRINT" THE FIRST PART OF THE LABEL MUST BE ONE WORD CONSISTING":PRINT" OF N
O MORE THAN 8 CHARACTERS, WITH NO EMBEDDED BLANKS":PRINT" OR PERIODS OR SLASHES.
 THE FIRST CHARACTER CANNOT BE"
2020 PRINT" A NUMBER.":PRINT:GOSUB140
2030 CLS:PRINT:PRINT
2040 PRINT" THE SECOND PART OF THE LABEL (AFTER THE PERIOD) IS THE":PRINT" NAME
OF THE OBSERVATION SYSTEM WITH WHICH THE DATA FILE":PRINT" IS TO BE ASSOCIATED.
 THE TWO PARTS MUST BE SEPARATED"
2050 PRINT" BY A PERIOD.  E.G., 'MARCH4.PROBING' IS A VALID DATA":PRINT" FILE LA
BEL.  THE FIRST PART, MARCH4, UNIQUELY IDENTIFIES":PRINT" THE DATA FILE, AND THE
 REMAINDER INDICATES WHICH"
2060 PRINT" OBSERVATION SYSTEM IT BELONGS WITH.":PRINT:PRINT" WHAT IS THE LABEL
FOR YOUR NEW DATA FILE?":GOSUB 200
2070 IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$="" THEN 1990
2080 Z$=A$:GOSUB 2250 :IF CO%=-1 THEN 1990 :REM TO SPLIT LABELINTO 2 PARTS
2090 GOSUB 2140 :IF CO%=-1 THEN 1990
2100 B$=Z$:CLS:PRINT" IS ";B$;" THE NEW LABEL YOU WANT TO PERMANENTLY USE":PRINT
" FOR YOUR NEW DATA FILE?":GOSUB 200  :IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$=
"" THEN 2100
2110 IF LEFT$(A$,1)<>"Y" THEN 1990
2120 CF$=CX$:DF$=Z$:NA%=0:SN$="UNSPECIFIED":TN$=SN$:SC$=SN$:ID%=0:SI%=0:TI%=0:D%
=0:GOSUB1770 :GOSUB 1020
2130 FC%=FC%+1:FL$(FC%)=DF$:GOSUB1300 :RETURN
```

```
2140 REM-SUB TO TEST VALIDITY OF LABEL FOR TRSDOS FILE NAME
2150 CO%=-1:IF LEN(A$)>8 THEN 2240
2160 I=ASC(MID$(A$,1,1)):IF I>=48 AND I<=57 THEN 2220
2170 FOR J=1 TO LEN(A$):B$=MID$(A$,J,1):I=ASC(B$):IF (I>=48 AND I<=57) OR (I>=65
 AND I<=90) THEN NEXT J ELSE GOTO 2230
2180 FOR J=1 TO FC%:I=INSTR(FL$(J),P$):IF I>0 THEN B$=MID$(FL$(J),1,I-1) ELSE B$
=FL$(J)
2190 IF B$=A$ THEN 2210  ELSE NEXT J
2200 CO%=+1:PRINT:PRINT Z$;" IS A VALID AND UNIQUE FILE LABEL.":PRINT:RETURN
2210 CLS:PRINT:PRINT" A FILE WITH THIS LABEL ALREADY EXISTS - DUPLICATES":PRINT"
 ARE NOT ALLOWED.":GOSUB140  :GOSUB1340 :RETURN
2220 PRINT:PRINT" LABEL CANNOT BEGIN WITH A NUMBER -";LEFT$(A$,1):GOSUB 140  :RE
TURN
2230 PRINT:PRINT" LABEL HAS AN INVALID IMBEDDED CHARACTER = ";B$:GOSUB 140  :RET
URN
2240 PRINT:PRINT" LABEL HAS MORE THAN 8 CHARACTERS - NOT ACCEPTABLE":GOSUB 140
:RETURN
2250 CO%=-1:FOR J=1 TO LEN(A$):IF MID$(A$,J,1)=P$ THEN 2260  ELSE NEXT J:PRINT"*
** INVALID LABEL *** PERIOD IS MISSING.":GOSUB 140  :RETURN
2260 CX$=MID$(A$,J+1,LEN(A$)):A$=MID$(A$,1,J-1):FOR J=1 TO FC%:IF CX$=FL$(J) THE
N 2270  ELSE NEXT J:PRINT" *** ERROR *** ";CX$;" WAS NOT FOUND IN YOUR CATALOG A
S":PRINT" AN OBSERVATION SYSTEM LABEL":GOSUB 140  :RETURN
2270 CO%=1:PRINT:PRINTCX$;" IS A VALID OBSERVATION SYSTEM LABEL.":RETURN
```

PROGRAM ALTCODE

```
10 CLEAR 2500:GOTO3580
20 LPRINT" *** E R R O R *** SEE SCREEN FOR DETAILS":RETURN
30 LPRINT DA$(J);" - ";TAB(34);DA(J);: IF PJ%(J)=0 THEN LPRINT:RETURN
40 K=DA(J)-1:LPRINT " = ";PJ$(PJ%(J)+K):RETURN
50 A%=DA(PT%):GOSUB260   :A1$=LM$(A1%):A2$=IM$(A2%):A3$=FM$(A3%):LPRINTPT%-CT%;TA
B(4);"- ";A1$;" ";A2$;" ";A3$:L=1:GOSUB70    :L=2:GOSUB70    :RETURN
60 FOR J=0 TO 7:LM%(J,L)=0:IM%(J,L)=0:NEXTJ:FOR J=0 TO 2:FM%(J,L)=0:NEXTJ:RETURN
70 LM%(A1%,L)=LM%(A1%,L)+1:IM%(A2%,L)=IM%(A2%,L)+1:FM%(A3%,L)=FM%(A3%,L)+1:RETUR
N
80 CLS:PRINTTAB(12)" *** ALTOS IDENTIFICATION DATA ***":RETURN
90 CLS:PRINTTAB(12)" *** ALTOS EDUCATIONAL ACTIVITY DATA ***":RETURN
100 CLS:PRINTTAB(12)" *** REAL-TIME CODING DATA ***":RETURN
110 CLS:PRINT:PRINT:PRINT" *** INVALID CHOICE ***":GOSUB150   :RETURN
120 GOSUB20   :PRINT" *** WARNING *** YOUR INVALID ID INFO PREVENTS YOU FROM":PR
INT" ENTERING ANY EDUCATIONAL ACTIVITY AND REAL-TIME CODING":PRINT" DATA":RETURN
130 PRINT" NOTE -- TO RETAIN AN ITEM'S PREVIOUS VALID VALUE AND ":PRINT" SKIP TO
 THE NEXT ITEM, PRESS <ENTER> ONLY.  OTHERWISE ":PRINT" ENTER THE NEW VALUE FOR
THAT ITEM.":PRINT:RETURN
140 GOSUB20   :PRINT" *** WARNING *** YOUR INVALID EDUCATIONAL ACTIVITY INFO":PR
INT" PREVENTS YOU FROM ENTERING ANY REAL-TIME CODES OR SAVING":PRINT" THIS EDUCA
TIONAL ACTIVITY INFO ON DISK":PRINT:RETURN
150 PRINTTAB(12);:INPUT " PRESS <ENTER> KEY TO CONTINUE ...";A$:RETURN
160 GOSUB20   :PRINT:PRINT" NOTE -- YOU CANNOT CODE REAL-TIME CODING DATA UNLESS
":PRINT" PRIMARY OR SECONDARY CONTENT IS READING OR MATH":PRINT:RETURN
170 PRINT:PRINT" NOTE -- ENTER ABBREVIATIONS FOR CODES ONE LINE AT A TIME,":PRIN
T" NO SPACES -- E.G., EOAFTS <ENTER>":PRINT:RETURN
180 PRINT DA$(J);":  ";DA(J):RETURN
190 'READ A$
200 A$=NU$:INPUT" -- ENTER INFO (OR . TO EXIT)";A$:RETURN
210 A$=NU$:PRINT:INPUT" DO YOU WANT TO MAKE ANY CHANGES (Y/N)";A$:A$=LEFT$(A$,1)
:RETURN
220 'SPLIT A$ INTO 3 PRS
230 A1$=LEFT$(A$,2):A2$=MID$(A$,3,2):A3$=RIGHT$(A$,2):RETURN
240 'SPLIT K
250 K=LEN(A$):FOR I=1 TO K:DA(J+I-1)=VAL(MID$(A$,I,1)):NEXTI:RETURN
260 'SPLIT A% INTO 3 DIGITS
270 A1%=INT(A%/100):A2%=INT((A%-A1%*100)/10):A3%=A%-A1%*100-A2%*10:RETURN
280 'SPLIT A$ INTO 3 DIGITS
290 A1%=VAL(LEFT$(A$,1)):A2%=VAL(MID$(A$,2,1)):A3%=VAL(RIGHT$(A$,1)):RETURN
300 'PACK A1,A2 & A3 INTO A%
310 A%=100*A1%+10*A2%+A3%:RETURN
320 PRINT:PRINT DA$(J);:GOSUB190   :IF DA(J)=0 THEN 330  ELSE IF LEFT$(A$,1)=P$ T
HEN RETURN ELSE IF A$=NU$ THEN 340
330 DA(J)=VAL(A$):IF (J=10) OR (J=20) THEN GOSUB 460  ELSE IF J=18 THEN GOSUB 49
0
340 GOSUB 350  :IF DA(J)=0 THEN 320  ELSE GOSUB 180  :RETURN
350 IF DA(J)=MV% THEN RETURN ELSE ON J GOSUB 380  ,400  ,420  ,420  ,440  ,400
,540  ,640  ,660  ,680  ,680  ,680  ,680  ,680  ,680  ,680  ,700  ,720  ,720  ,6
80  ,680  ,680  ,680  ,680  ,680  ,680  ,740  ,740  ,540  :RETURN
360 'ERROR IN ID/EAS
370 GOSUB20   :DA(J)=0:PRINT:PRINT" *** ERROR IN ";DA$(J);" *** RE-ENTER":RETURN
380 'CHECK DATE
390 A$=RIGHT$(STR$(DA(J)),6):GOSUB220   :A1%=VAL(A1$):A2%=VAL(A2$):A3%=VAL(A3$):I
F (A1%>=1) AND (A1%<=12) AND (A2%>=1) AND (A2%<=31) AND (A3%>80) THEN RETURN ELS
E GOSUB 360  :RETURN
400 'CHECK OBS# OR CLASS SIZE
410 IF (DA(J)>0) AND (DA(J)<1000) THEN RETURN ELSE GOSUB 360  :RETURN
```

```
420 ' CHECK TCH OR TS #
430 IF (DA(J)>0) AND (DA(J)<1000) THEN RETURN ELSE GOSUB 360  :RETURN
440 'CLASS TYPE CHECK
450 IF (DA(J)>0) AND (DA(J)<5) THEN RETURN ELSE GOSUB 360  :RETURN
460 FOR I=J+1 TO J+6:DA(I)=MV%:NEXTI:IF DA(J)=MV% THEN RETURN ELSE GOSUB240
470 FOR I=J TO J+6:IF DA(I)=MV% THEN RETURN ELSE IF (DA(I)>0) AND (DA(I)<8) THEN
 480  ELSE GOSUB 360  :RETURN
480 NEXTI:RETURN
490 DA(J+1)=MV%:IF DA(J)=MV% THEN RETURN
500 GOSUB240  :FOR I=J TO J+1:IF DA(I)=MV% THEN RETURN ELSE IF (DA(I)>0) AND (DA
(I)<7) THEN 510  ELSE GOSUB360  :RETURN
510 NEXTI:RETURN
520 'SPLIT TIME
530 A1%=INT(DA(J)/100):A2%=DA(J)-A1%*100:RETURN
540 'CHECK BEGIN AND END OF ACTIVITY TIMES
550 GOSUB 520  :IF (A1%>0) AND (A1%<24) AND (A2%>=0) AND (A2%<60)THEN GOSUB 570
 :GOSUB 600  :RETURN
560 GOSUB 360  :RETURN
570 'CONVERT TO 24 HR CLOCK
580 IF (A1%>=1) AND (A1%<=6) THEN A1%=A1%+12
590 DA(J)=A1%*100+A2%:RETURN
600 'COMPUTE ALLOCATED TIME IF POSSIBLE
610 IF (DA(7)=0) OR (DA(29)=0) THEN RETURN
620 IF DA(7)>DA(29) THEN PRINT" *** START TIME EXCEEDS STOP TIME ***";:GOSUB 360
 :RETURN
630 K=J:J=29:GOSUB520  :DA(30)=A1%*60+A2%:J=7:GOSUB520  :J=K:DA(30)=DA(30)-(A1%*
60+A2%):RETURN
640 'CHECK # OF STUDENTS IN SAME ACTIVITY
650 IF (DA(J)>0) AND (DA(J)<=DA(6)) THEN RETURN ELSE GOSUB 360  :RETURN
660 'CHECK TS PACING
670 IF (DA(J)>0) AND (DA(J)<3) THEN RETURN ELSE GOSUB 360  :RETURN
680 'CHECK TS ACTIVITY
690 IF (DA(J)>0) AND (DA(J)<8) THEN RETURN ELSE GOSUB 360  :RETURN
700 'CHECK TASK DIFFICULTY
710 IF (DA(J)>0) AND (DA(J)<4) THEN RETURN ELSE GOSUB 360  :RETURN
720 'CHECK TS INSTRUCTOR TYPE
730 IF (DA(J)>0) AND (DA(J)<7) THEN RETURN ELSE GOSUB 360  :RETURN
740 'CONTENT CHECK
750 A=DA(J):IF ((A>9) AND (A<31)) OR ((A>39) AND (A<43)) OR ((A>49) AND (A<59))
THEN RETURN ELSE GOSUB 360  :RETURN
760 'MAIN LEVEL
770 GOSUB980
780 CLS:PRINT:PRINTTAB(6)" ALTOS DATA ENTRY/MODIFICATION PROGRAM":PRINT
790 PRINT"   L = LABEL A NEW DATA FILE (FOR A DAY OF DATA ON TS)"
800 PRINT"   I = INSERT DATA FOR NEW EDUCATIONAL ACTIVITY(IES)"
810 PRINT"   M = MODIFY DATA ON OLD EDUCATIONAL ACTIVITY(IES)"
820 PRINT"       PREVIOUSLY ENTERED AND SAVED ON DISK"
830 PRINT"   H = MODIFY PREVIOUSLY ENTERED DATA FILE HEADER INFO"
840 PRINT"   R = RETRIEVE OLD DATA FILE FROM DISK STORAGE"
850 PRINT"   D = DELETE OLD DATA FILE FROM DISK STORAGE"
860 PRINT"   P = PRINT CONTENTS OF DATA FILE ON PAPER"
870 PRINT"   A = SET UP AUXILLIARY PRINTER (HEATH OR DECWRITER)":PRINT
880 GOSUB 190  :IF LEFT$(A$,1)=P$ THEN PRINT" EXIT ALTOS DATA ENTRY/MODIFICATION
 PROGRAM":END
890 IF A$="L" THEN GOSUB 4170 :GOTO760
900 IF A$="I" THEN GOSUB 2150 :GOTO 760
910 IF A$="M" THEN GOSUB 2340 :GOTO 760
```

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920 IF A$="H" THEN GOSUB 1170 :GOTO760
930 IF A$="R" THEN GOSUB 2940 :GOTO 760
940 IF A$="D" THEN GOSUB 3000 :GOTO 760
950 IF A$="P" THEN GOSUB3140 :GOTO760
960 IF A$="A" THEN GOSUB3470 :GOTO760
970 GOSUB110  :GOTO 780
980 'PRINT HEADER
990 CLS:PRINTTAB(12);" HEADER INFORMATION:":PRINT
1000 PRINT" OBSERVATION SYSTEM - ";CF$:PRINT" DATA FILE NAME - ";DF$:PRINT:PRINT
" TOTAL # ACTIVITIES =";NA%;"    TRANSITION TIME =";TR%:PRINT:PRINT" TARGET STUD
ENT NAME - ";TN$:PRINT" CODER NAME - ";CN$:PRINT" COMMENTS - ";DC$
1010 PRINT:PRINT" DAY START TIME: ";DS;"   DAY END TIME: ";DE
1020 PRINT:PRINT:GOSUB150  :RETURN
1030 'ENTER DF HEADER
1040 CLS:PRINT" ENTER HEADER INFORMATION":PRINT
1050 PRINT"  TN = TARGET STUDENT NAME"
1060 PRINT"  CN = CODER NAME"
1070 PRINT"  C  = COMMENTS, IF ANY"
1080 PRINT"  DS = DAY START AND END TIMES"
1090 PRINT"  L  = LIST HEADER INFO":PRINT:PRINT" -- NOTE -- TO MODIFY HEADER, RE
-ENTER CHOICE":PRINT
1100 GOSUB190  :IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$=NU$ THEN 1040
1110 IF A$="TN" THEN PRINT:PRINT" WHAT IS THE TARGET STUDENT NAME":GOSUB190  :TN
$=A$:GOTO1040
1120 IF A$="CN" THEN PRINT:PRINT" WHAT IS THE CODER NAME ":GOSUB190  :CN$=A$:GOT
O1040
1130 IF A$="C" THEN PRINT:PRINT" WHEN ENTERING COMMENTS, DON'T USE COMMAS, SEMIC
OLONS,":PRINT" OR COLONS ":GOSUB190  :DC$=A$:GOTO1040
1140 IF A$="L" THEN GOSUB 980  :GOTO1040
1150 IF A$="DS" THEN J=7:GOSUB320  :DS=DA(J):J=29:GOSUB320  :DE=DA(J):GOTO1040
1160 GOSUB110  :GOTO1040
1170 'MODIFY DF HEADER
1180 IF DF$="NONE" THEN PRINT" YOU MUST LABEL DATA FILE FIRST":GOSUB150  :RETURN
1190 GOSUB1030 :IF NA%>0 THEN GOSUB 2530 ELSEGOSUB2640
1200 RETURN
1210 'TRANSFER DF TO DA
1220 K=(AN%-1)*SL%:FOR J=1 TO SL%:DA(J)=DF(K+J):NEXTJ:RETURN
1230 'ENTER OR MODIFY ID INFO
1240 IE%=0:CLS:PRINT"    ENTER OR MODIFY ID INFO":PRINT:GOSUB130
1250 FOR J=1 TO 6:GOSUB320  :IF LEFT$(A$,1)=P$ THEN 1270
1260 NEXTJ:GOSUB 210  :IF A$="Y" THEN 1250
1270 PRINT:PRINT" ... PERFORMING ERROR CHECK ON ID INFG ...":PRINT
1280 FOR J=1 TO 6:GOSUB 350  :IF DA(J)=0 THEN GOSUB 320  :IF LEFT$(A$,1)=P$ THEN
 1300
1290 NEXTJ:RETURN
1300 IE%=1:GOSUB 120  :RETURN
1310 'INSERT/MODIFY EDUCATIONAL ACTIVITY INFO
1320 IF IE%<>0 THEN GOSUB 120
1330 GOSUB 1280 :IF IE%<>0 THEN RETURN
1340 EE%=0:CLS:PRINT" ENTER OR MODIFY EDUCATIONAL ACTIVITY INFO":PRINT:GOSUB 130

1350 'BEGIN TIME, NS, PACING, TS ACTIVITY 1-7
1360 FOR J=7 TO 10:GOSUB 320  :IF LEFT$(A$,1)=P$ THEN 1460
1370 NEXT J
1380 'TASK DIFFICULTY AND TS INSTRUCTOR 1-2
1390 FOR J=17 TO 18:GOSUB 320  :IF LEFT$(A$,1)=P$ THEN 1460
1400 NEXT J
```

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1410 'INSTRUCTOR ACTIVITY 1-7
1420 J=20:GOSUB 320  :IF LEFT$(A$,1)=P$ THEN 1460
1430 'CONTENT 1-2 AND END TIME
1440 FOR J=27 TO 29:GOSUB 320  :IF LEFT$(A$,1)=P$ THEN 1460
1450 NEXTJ:GOSUB 210  :IF A$="Y" THEN 1350
1460 'CHECK EDUC ACTIVITY INFO
1470 PRINT:PRINT" ... PERFORMING ERROR CHECK ON EDUCATIONAL ACTIVITY INFO ...":P
RINT
1480 FOR J=7 TO 29:GOSUB 350  :IF DA(J)=0 THEN GOSUB 320  :IF LEFT$(A$,1)=P$ THE
N 1500
1490 NEXTJ:RETURN
1500 EE%=1:GOSUB 140  :RETURN
1510 'READ LINE OF CODES
1520 L=PT%-CT%:PRINT" LINE";L;
1530 GOSUB 190  :IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$=NU$ AND L>1 THEN 1620
1540 GOSUB 220  :A1%=0:A2%=0:A3%=0:FOR J=1 TO 7:IF A1$=LM$(J) THEN 1560
1550 NEXTJ:GOTO 1630
1560 A1%=J:FOR J=0 TO 7:IF A2$=IM$(J) THEN 1580
1570 NEXTJ:GOTO 1630
1580 A2%=J:FOR J=0 TO 2:IF A3$=FM$(J) THEN 1600
1590 NEXTJ:GOTO 1630
1600 A3%=J:REM IF (A1$=LM$(6)) AND (A2$<>IM$(0)) THEN 1560
1610 IF (A2$=IM$(0)) AND (A3$<>FM$(0)) THEN 1630
1620 GOSUB 300  :DA(PT%)=A%:RETURN
1630 GOSUB20   :PRINT" *** ERROR IN CODES *** RE-ENTER":GOTO 1520
1640 'INSERT REAL-TIME CODES
1650 IF DA(CT%)>=(NR%-2) THEN GOSUB20   :PRINT" DATA ARRAY FULL -- YOU NEED TO S
TART A NEW ACTIVITY":PRINT" WITH DUPLICATE ID AND EDUCATIONAL ACTIVITY INFO IN":
PRINT" ORDER TO ADD SOME MORE REAL-TIME CODES":GOSUB 150  :RETURN
1660 PT%=CB%+DA(CT%):GOSUB 1510 :IF LEFT$(A$,1)=P$ THEN RETURN ELSE DA(CT%)=DA(C
T%)+1:GOTO 1650
1670 'CHANGE REAL-TIME CODES
1680 PRINT:PRINT" LINE # TO CHANGE":GOSUB190  :IF LEFT$(A$,1)=P$ THEN RETURN
1690 PT%=VAL(A$)+CT%:IF (PT%<CB%) OR (PT%>(CT%+DA(CT%))) THEN GOSUB20   :PRINT"
*** INVALID LINE # ***":GOTO 1680
1700 GOSUB 1890 :PRINT:PRINT" NOW ENTER CHANGE IF ABOVE LINE IS TO BE CORRECTED"
1710 GOSUB 1510 :IF LEFT$(A$,1)=P$ THEN RETURN ELSE PRINT " -- CHANGE DONE --":G
OSUB 1890 :GOTO 1680
1720 'DELETE REAL-TIME CODES
1730 IF DA(CT%)=0 THEN PRINT " SORRY, NO CODES ARE AVAILABLE TO DELETE":GOSUB 15
0  :RETURN
1740 PRINT:PRINT" ENTER LINE # TO DELETE -- NOTE, IF YOU PLAN TO DELETE SEVERAL"
:PRINT" LINES, BE SURE TO ENTER THE LARGEST LINE NUMBER FIRST,":PRINT" THE NEXT
LARGEST SECOND, ETC., SO THAT THE LOWER LINE":PRINT" NUMBERS ARE UNAFFECTED."
1750 GOSUB 190  :IF LEFT$(A$,1)=P$ THEN RETURN
1760 PT%=VAL(A$)+CT%
1770 IF (PT%<CB%) OR (PT%>(CT%+DA(CT%))) THEN GOSUB20   :PRINT:PRINT" *** INVALI
D LINE #":GOTO 1730
1780 GOSUB 1890 :PRINT" IS THIS THE LINE YOU WISH TO DELETE?":GOSUB 190  :IF LEF
T$(A$,1)=P$ THEN RETURN ELSE IF LEFT$(A$,1)<>"Y" THEN 1730
1790 FOR J=PT% TO (CT%+DA(CT%)-1):DA(J)=DA(J+1):NEXTJ:DA(CT%+DA(CT%))=0:DA(CT%)=
DA(CT%)-1:PRINT" *** DELETE DONE ***":GOTO 1730
1800 'LIST ID AND EAS DATA
1810 GOSUB80   :FOR J=1 TO 6:GOSUB 180  :NEXTJ:GOSUB150
1820 GOSUB90   :FOR J=7 TO 19:GOSUB180  :NEXTJ:GOSUB150
1830 GOSUB90   :FOR J=20 TO 30:GOSUB180  :NEXTJ:GOSUB150  :RETURN
1840 'LIST RTC DATA
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1850 GOSUB100  :PRINTDA$(CT%-1);DA(CT%-1):PRINTDA$(CT%);DA(CT%):PRINT
1860 K=CT%+DA(CT%):FOR I=CB% TO K STEP 12:FOR J=I TO I+11:IF J>K THEN 1880
1870 PT%=J:GOSUB1890 :NEXTJ:GOSUB150  :NEXTI
1880 GOSUB150  :RETURN
1890 'PRINT CODE LINE
1900 A%=DA(PT%):GOSUB260  :A1$=LM$(A1%):A2$=IM$(A2%):A3$=FM$(A3%)
1910 PRINT" LINE -";PT%-CT%;"  ";A1$;" ";A2$;" ";A3$:RETURN
1920 'REAL-TIME CODING
1930 'CHECK ID & EAS VALIDITY
1940 IF IE%<>0 THEN GOSUB120  :GOSUB1280 :IF IE%<>0 THEN RETURN
1950 IF EE%<>0 THEN GOSUB140  :GOSUB1480 :IF EE%<>0 THEN RETURN
1960 'CHECK TO MAKE SURE READING OR MATH CODED
1970 IF (DA(27)>30) OR (DA(27)=MV%) THEN IF (DA(28)>30) OR (DA(28)=MV%)THEN GOSU
B 160  :RETURN
1980 CLS:PRINT" ENTER NEW REAL-TIME CODING INFO:":GOTO 2010
1990 PRINT:PRINTDA$(CT%-1);" (HHMM)":GOSUB190  :J=CT%-1:DA(J)=VAL(A$):GOSUB 520
 :IF (A1%>0) AND (A1%<24) AND (A2%>=0) AND (A2%<60) THEN GOSUB570  ELSE GOSUB 36
0  :GOTO 1990
2000 PRINT DA$(CT%-1);DA(CT%-1):GOSUB 210  :IF A$="Y" THEN GOTO 1990 ELSE RETURN
2010 GOSUB1990 :GOSUB170  :GOSUB 1640 :GOSUB210  :IF A$<>"Y" THEN RETURN
2020 'MODIFY RTC
2030 CLS:PRINT:PRINT" MODIFY REAL-TIME CODES:":PRINT
2040 PRINT"  I = INSERT A LINE OF CODES"
2050 PRINT"  C = CHANGE A LINE OF CODES"
2060 PRINT"  D = DELETE A LINE OF CODES"
2070 PRINT"  T = CHANGE TIME STARTED FOR REAL-TIME CODING"
2080 PRINT"  L = LIST THE REAL-TIME CODES":PRINT
2090 GOSUB190  :IF A$="I" THEN GOSUB 1640 :GOTO 2020
2100 IF A$="C" THEN GOSUB 1670 :GOTO 2020
2110 IF A$="D" THEN GOSUB 1720 :GOTO 2020
2120 IF A$="L" THEN GOSUB 1840 :GOTO 2020
2130 IF A$="T" THEN GOSUB 1990 :GOTO 2020
2140 IF LEFT$(A$,1)=P$ THEN RETURN ELSE GOSUB110  :GOTO2020
2150 'INSERT NEW ACTIVITY INTO DATA FILE
2160 IF DF$="NONE" THEN GOSUB 4170
2170 CLS:PRINT"   INSERT A NEW ACTIVITY INTO ";DF$:PRINT
2180 PRINT"  ID = ENTER NEW IDENTIFICATION INFO OR MODIFY LAST ID"
2190 PRINT" EAS = SAME ID AS BEFORE; ENTER NEW ED. ACTIVITY INFO & SAVE"
2200 PRINT" RTC = SAME ID AS BEFORE; ENTER NEW ED. ACTIVITY INFO"
2210 PRINT"       AND REAL-TIME CODES AND SAVE"
2220 PRINT"LIST = LIST CONTENTS OF CURRENT ID, ED. ACTIVITY, AND"
2230 PRINT"       REAL-TIME CODES"
2240 GOSUB190  :IF NA%>(AM%-1) THEN GOSUB20   : PRINT" *** ACTIVITY MAX REACHED
*** DATA FILE FULL":GOSUB150  :RETURN
2250 IF A$="ID" THEN GOSUB 1230 :GOTO 2150
2260 IF A$="EAS" THEN 2300
2270 IF A$="RTC" THEN 2320
2280 IF A$="LIST" THEN GOSUB 1800 :GOSUB 1840 :GOTO 2150
2290 IF LEFT$(A$,1)=P$ THEN RETURN ELSE GOSUB110  :GOTO 2150
2300 FOR J=7 TO SL%:DA(J)=0:NEXTJ:GOSUB 1310 :IF (IE%=0) AND (EE%=0) THEN NA%=NA
%+1:AN%=NA%:GOSUB 2500
2310 GOTO 2150
2320 FOR J=7 TO SL%:DA(J)=0:NEXTJ:GOSUB 1310 :IF (IE%=0) AND (EE%=0) THEN GOSUB
1920 :NA%=NA%+1:AN%=NA%:GOSUB2500
2330 GOTO 2150
2340 'MODIFY AN OLD ACTIVITY
2350 IF DF$="NONE" THEN GOSUB 2940
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2360 GOSUB2840 :IF LEFT$(A$,1)=P$ THEN RETURN ELSE GOSUB1210
2370 CLS:PRINTTAB(12)" MODIFY AN OLD ACTIVITY:":PRINT
2380 PRINT"  MID = MODIFY ID INFO FOR THIS ACTIVITY"
2390 PRINT" MEAS = MODIFY ED. ACTIVITY INFO FOR THIS ACTIVITY"
2400 PRINT" MRTC = MODIFY REAL-TIME CODING DATA FOR THIS ACTIVITY"
2410 PRINT" LIST = LIST ID, ED. ACTIVITY, AND REAL-TIME CODING INFO"
2420 PRINT" DACT = PERMANENTLY DELETE THIS ACTIVITY FROM DISK STORAGE"
2430 PRINT:GOSUB190  :IF LEFT$(A$,1)=P$ THEN PRINT:PRINT" *** DO YOU WANT YOUR M
ODIFICATIONS OF THIS ACTIVITY":PRINT" PERMANENTLY SAVED ON DISK (Y/N)":GOSUB190
 :IF A$<>"Y"THEN RETURN ELSE GOSUB2500 :RETURN
2440 IF A$="MID" THEN GOSUB1230 :GOTO2370
2450 IF A$="MEAS" THEN GOSUB 1310 :GOTO2370
2460 IF A$="MRTC" THEN GOSUB 2020 :GOTO2370
2470 IF A$="LIST" THEN GOSUB1800 :GOSUB1840 :GOTO2370
2480 IF A$="DACT" THEN GOSUB 2880 :RETURN
2490 GOSUB110  :GOTO2370
2500 'TRANSFER DA TO DF
2510 K=SL%*(AN%-1):IF K>AM%*SL%-SL% THEN PRINT" ERROR AT 3510 --SEE TED":END
2520 FOR J=1TOSL%:DF(J+K)=DA(J):NEXTJ
2530 'ORDER ACTIVITIES IN DF
2540 FOR J=1 TO NA%:BE(J)=DF(SL%*(J-1)+7):EN(J)=DF(SL%*(J-1)+29):R%(J)=J:NEXTJ:I
F NA%=1 THEN 2620
2550 FOR I=1 TO (NA%-1):FOR J=1 TO (NA%-I):IF BE(J)>BE(J+1) THENA=BE(J):BE(J)=BE
(J+1):BE(J+1)=A:A=EN(J):EN(J)=EN(J+1):EN(J+1)=A:A1%=R%(J):R%(J)=R%(J+1):R%(J+1)=
A1%
2560 NEXTJ:NEXTI
2570 'COMPUTE TRANSITION TIME AND CHECK FOR OVERLAP
2580 TR%=0:SE%=0:FOR J=1 TO (NA%-1):IF BE(J)>EN(J) THEN GOSUB20   :PRINT" *** SE
QUENCE ERROR *** START TIME EXCEEDS STOP TIME FOR":PRINT" ACTIVITY #";R%(J);"  S
TART=";BE(J);"   STOP=";EN(J):SE%=SE%+1
2590 IF EN(J)>BE(J+1)THEN GOSUB20   :PRINT" *** OVERLAPPING ACTIVITIES ERROR ***
 ACTIVITY #";R%(J):PRINT" ENDS AT";EN(J);" BUT ACTIVITY #";R%(J+1);" BEGINS AT";
BE(J+1):SE%=SE%+1
2600 NEXTJ
2610 IF SE%>0 THEN PRINT:PRINT" THESE ERRORS PREVENT SAVING YOUR DATA FILE ON DI
SK.":PRINT" YOU MUST RECTIFY THESE ERRORS BY MODIFYING IT.":PRINT:GOSUB150  :RET
URN
2620 DA(7)=DS:DA(29)=DE:GOSUB630  :TR%=DA(30):FOR J=1 TO NA%:TR%=TR%-DF(100*(J-1
)+30):NEXTJ
2630 GOSUB 2640 :RETURN
2640 'WRITE DF TO DISK
2650 PRINT:PRINT" ... NOW SAVING ";DF$;" ON DISK ...":PRINT
2660 OPEN"O",1,DF$:PRINT#1,DF$:PRINT#1,CF$:PRINT#1,NA%:PRINT#1,DS:PRINT#1,DE:PRI
NT#1,TR%:PRINT#1,TN$:PRINT#1,CN$:PRINT#1,DC$:IF NA%<=0 THEN GOTO 2710
2670 FOR J=1 TO NA%:K=SL%*(R%(J)-1):FOR I=K+1 TO K+CT%:PRINT#1,DF(I):NEXTI
2680 IF DF(K+CT%)=0 THEN 2700
2690 FOR I=(K+CB%) TO (K+CT%+DF(K+CT%)):PRINT#1,DF(I):NEXTI
2700 NEXTJ
2710 CLOSE:RETURN
2720 'READ DF FROM DISK
2730 'FOR J=1 TO AM%*SL%:DF(J)=0:NEXTJ:ON ERROR GOTO 3880
2740 ON ERROR GOTO 2820
2750 OPEN"I",1,DF$:INPUT#1,A$:INPUT#1,B$:IF (A$<>DF$)  THEN PRINT" *** NOT A VAL
ID ALTOS FILE ***":GOSUB 150  :GOTO 2800
2760 CF$=B$:INPUT#1,NA%:INPUT#1,DS:INPUT#1,DE:INPUT#1,TR%:INPUT#1,TN$:INPUT#1,CN
$:INPUT#1,DC$:IF NA%<=0 THEN GOTO 2800
2770 FOR J=1 TO NA%:K=SL%*(J-1):FOR I=K+1 TO K+CT%:IF EOF(1) THEN 2810 ELSE INPU
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T#1,DF(I):NEXTI:IF DF(K+CT%)=0 THEN 2790
2780 FOR I=(K+CB%) TO (K+CT%+DF(K+CT%)):IF EOF(1) THEN 2830 ELSE INPUT#1,DF(I):N
EXTI
2790 NEXTJ
2800 CLOSE:ON ERROR GOTO 3550 :RETURN
2810 NA%=J-1:PRINT" EOF PREMATURELY ENCOUNTERED AFTER ACTIVITY #";NA%:PRINT" DAT
A HAVE BEEN LOST AFTER THIS ACTIVITY.":GOSUB150  :GOTO2800
2820 ON ERROR GOTO 3550 :IF ERR/2<>53 THEN 3550  ELSE PRINT " FILE NOT FOUND":RE
SUME 2800
2830 PRINT" EOF ENCOUNTERED IN DATA FILE -- SEE TED":GOSUB150  :GOTO2800
2840 'FIND AN ACTIVITY
2850 PRINT:PRINT" SPECIFY THE TIME STARTED FOR THE ED. ACTIVITY YOU":PRINT" WANT
 TO FIND ":GOSUB190  :IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$=NU$ THEN 2850
2860 A%=VAL(A$):FOR J=1 TO NA%:IF A%=DF((J-1)*SL%+7) THEN AN%=J:RETURN
2870 NEXTJ:PRINT:PRINT" TIME NOT FOUND -- USE 24 HR. NOTATION FOR P.M. HRS.":GOT
O 2850
2880 'DELETE A SUBFILE IF DF
2890 GOSUB 1800 :GOSUB1840
2900 PRINT:PRINT" ARE YOU SURE THIS IS THE ACTIVITY YOU WANT TO DELETE?":GOSUB19
0  :IF LEFT$(A$,1)<>"Y" THEN RETURN
2910 IF AN%=NA% THEN 2930
2920 FOR J=AN% TO NA%:K=SL%*(J-1):FOR I=1 TO SL%:DF(K+I)=DF(K+I+SL%):NEXTI:NEXTJ
2930 NA%=NA%-1:PRINT:PRINT" *** ACTIVITY DELETED ***":GOSUB 2530 :RETURN
2940 'FIND A DF
2950 GOSUB 3020
2960 GOSUB3110 :PRINT:PRINT" WHAT IS THE NAME OF THE DATA FILE YOU WANT TO RETRI
EVE?":GOSUB190  :IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$=NU$ THEN 2960
2970 FOR J=1 TO FC%:IF A$=FL$(J) THEN 2990
2980 NEXTJ:PRINT" FILE NOT FOUND IN CATALOG":GOSUB150  :GOTO2960
2990 DF$=A$:GOSUB 2720 :RETURN
3000 'DELETE A DF
3010 PRINT" HERE IS WHERE DELETE GOES":GOSUB150  :RETURN
3020 'READ FILELIST
3030 ON ERROR GOTO 3060 :FC%=0:OPEN"I",1,"FILELIST":FOR J=1 TO MF%:IF EOF(1) THE
N 3050
3040 INPUT#1,FL$(J):FC%=FC%+1:NEXTJ
3050 CLOSE:ON ERROR GOTO 3550 :RETURN
3060 ON ERROR GOTO 3550 :IF ERR/2<>53 THEN 3550  ELSE PRINT" FILELIST NOT FOUND"
:RESUME 3050
3070 'WRITE FILELIST TO DISK
3080 OPEN"O",1,"FILELIST":FOR J=1 TO FC%:IF FL$(J)="0" THEN 3100
3090 PRINT#1,FL$(J)
3100 NEXTJ:CLOSE:RETURN
3110 'PRINT FILELIST
3120 CLS:PRINT" TOTAL # OF FILES =";FC%:PRINT:PRINT" CATALOG OF EXISTING OBSERVA
TION SYSTEM/DATA FILES:":PRINT
3130 FOR J=1 TO FC% STEP24:FOR I=J TO J+23 STEP4:PRINTFL$(I),FL$(I+1),FL$(I+2),F
L$(I+3):NEXTI:PRINT:GOSUB150  :NEXTJ:RETURN
3140 'PRINT DF
3150 LPRINT CHR$(12):POKE &HFC05,0
3160 L=2:GOSUB60   :GOSUB3320 :FOR I=1 TO NA%:AN%=I:GOSUB1210 :GOSUB3190
3170 GOSUB3230 :IF DA(CT%)>0 THEN GOSUB 3290
3180 NEXTI:L=2:GOSUB3370 :RETURN
3190 'PRINT ID
3200 LPRINTCR$:LPRINT" ******* IDENTIFICATION DATA ";STRING$(35,"*"):LPRINTCR$:F
OR J=1 TO 6:IF DA(J)>0 THENGOSUB30   :GOTO3220
3210 LPRINTDA$(J);" -";TAB(34);DA(J);" ----MISSING DATA----"
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```
3220 NEXTJ:LPRINTCR$:RETURN
3230 'PRINT EAS
3240 LPRINTCR$:LPRINT" ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY #";AN%:
LPRINTCR$
3250 FOR J=7 TO 30:IF DA(J)>0 THEN GOSUB 30   :GOTO3280
3260 IF (J=28)OR(J=19)OR((J>20)AND(J<=26))OR((J>10)AND(J<=16)) THEN 3280
3270 LPRINT DA$(J);" - ";TAB(34);DA(J);" ----MISSING DATA----"
3280 NEXTJ:RETURN
3290 'PRINT RTC DATA
3300 L=1:GOSUB60   :LPRINTCR$:LPRINT" ****** REAL-TIME CODING DATA ****** ACTIVI
TY #";AN%:LPRINTCR$:LPRINT DA$(CT%-1);DA(CT%-1):LPRINT DA$(CT%);DA(CT%):LPRINTCR
$
3310 K=CT%+DA(CT%):FOR J=CB% TO K:PT%=J:GOSUB50   :NEXTJ:L=1:GOSUB3370 :RETURN
3320 'PRINT HEADER
3330 LPRINTCR$,CR$
3340 LPRINT" OBSERVATION SYSTEM - ";CF$:LPRINT" DATA FILE NAME - ";DF$:LPRINTCR$
:LPRINT" TOTAL # OF ACTIVITIES =";NA%;"    TRANSITION TIME =";TR%:LPRINTCR$:LPRI
NT" TARGET STUDENT NAME - ";TN$:LPRINT" CODER NAME - ";CN$:LPRINT" COMMENTS - ";
DC$
3350 LPRINTCR$:LPRINT" DAY START TIME:";DS;"     DAY END TIME:";DE
3360 LPRINTCR$:RETURN
3370 'PRINT RTC SUMMARY
3380 LPRINTCR$:LPRINT"  *** REAL-TIME CATEGORY SUMMARY ***":LPRINTCR$
3390 IF L=1 THEN LPRINT TAB(10);"(FOR THIS ACTIVITY)"
3400 IF L=2 THEN LPRINT TAB(10);"(FOR ALL ACTIVITIES)"
3410 LPRINTCR$:LPRINT TAB(7)"FREQUENCY";TAB(22);"PERCENT"
3420 LPRINT TAB(7);"---------";TAB(22);"-------":LPRINTCR$
3430 TC%=0:FOR J=1 TO 7:TC%=TC%+LM%(J,L):NEXTJ:IF TC%=0 THEN LPRINT" --- NO REAL
-TIME CODES THIS DAY --- ":RETURN
3440 FOR J=1 TO 7:LPRINT LM$(J);TAB(10);LM%(J,L);TAB(21);(LM%(J,L)/TC%)*100:NEXT
J:LPRINTCR$
3450 FOR J=0 TO 7:LPRINT IM$(J);TAB(10);IM%(J,L);TAB(21);(IM%(J,L)/TC%)*100:NEXT
J:LPRINTCR$
3460 FOR J=0 TO 2:LPRINT FM$(J);TAB(10);FM%(J,L);TAB(21);(FM%(J,L)/TC%)*100:NEXT
J:LPRINTCR$:RETURN
3470 'USE AUX. PRINTER
3480 CLS:PRINT:PRINT" IS THE AUXILLIARY PRINTER HOOKED UP TO THE RS-232 AND POWE
R ON?":GOSUB190  :IF LEFT$(A$,1)<>"Y" THEN RETURN
3490 POKE &HFC00,72
3500 POKE &HFC01,60:POKE &HFC02,6:POKE &HFC04,0:POKE &HFC05,0:POKE &HFC06,0:POKE
 &HFC07,0:POKE 16421,2:POKE 16422,9:POKE 16423,252
3510 PRINT:PRINT" CHECK THE AUXILLIARY PRINTER FOR A MESSAGE...":LPRINT" *** AUX
ILLIARY PRINTER READY ***":LPRINT CHR$(12)
3520 RETURN
3530 LPRINT" CONTENTS OF DF":FOR J=1 TO NA%*SL%:LPRINT J;"-";DF(J):NEXTJ:END
3540 LPRINT" CONTENTS OF DA":FOR J=1 TO SL%:LPRINT J;"-";DA(J):NEXTJ:END
3550 CLOSE:PRINT"ERROR#";((ERR/2)+1);" AT";ERL:PRINT"(SUB 1 IF>49)"
3560 IF ERR/2=61 THEN PRINT" *** WARNING *** THIS ERROR MEANS THAT YOUR DISK IS
FULL.":PRINT" YOU CANNOT CREATE ANY MORE FILES ON THIS DISK.":PRINT" YOU CAN, HO
WEVER, MODIFY EXISTING ONES.":END
3570 END
3580 ON ERROR GOTC 3550 :CF$="NONE":DF$="NONE":LC$="CODE":NC$="CARTLO":D$="UNSPE
CIFIED"
3590 CN$=D$:TN$=D$:DC$=D$
3600 MF%=48:P$=".":AM%=25:CR$=CHR$(13):NI%=6:NE%=24:NR%=70:NU$="":MV%=-99:CT%=32
:CB%=33:AN%=0:NA%=0:SL%=100:DIM DA(SL%),DA$(CT%),DF(SL%*AM%),BE(AM%),EN(AM%),R%(
AM%),FL$(MF%),PJ%(30),PJ$(87),LM$(7),IM$(7),FM$(2),LM%(7,2),IM%(7,2),FM%(2,2)
```

```
3610 DEFINT I-L
3620 FOR J= 1 TO CT%:READ DA$(J):NEXTJ
3630 DATA OBSERVATION DATE (MMDDYY)
3640 DATA OBSERVER #
3650 DATA TEACHER #
3660 DATA TARGET STUDENT #
3670 DATA CLASS TYPE (1 - 4)
3680 DATA CLASS SIZE (1 - 999)
3690 DATA TIME STARTED (HHMM)
3700 DATA # STUDENTS IN SAME ACTIVITY
3710 DATA TS PACING
3720 DATA TS ACTIVITY (1 - 7)
3730 DATA TS ACTIVITY -2ND
3740 DATA TS ACTIVITY -3RD
3750 DATA TS ACTIVITY -4TH
3760 DATA TS ACTIVITY -5TH
3770 DATA TS ACTIVITY -6TH
3780 DATA TS ACTIVITY -7TH
3790 DATA TS TASK DIFFICULTY (1 - 3)
3800 DATA TS INSTRUCTOR (1 - 6)
3810 DATA TS INSTRUCTOR (EXTRA)
3820 DATA INSTRUCTOR ACTIVITY (1 - 7)
3830 DATA INSTRUCTOR ACTIVITY -2ND
3840 DATA INSTRUCTOR ACTIVITY -3RD
3850 DATA INSTRUCTOR ACTIVITY -4TH
3860 DATA INSTRUCTOR ACTIVITY -5TH
3870 DATA INSTRUCTOR ACTIVITY -6TH
3880 DATA INSTRUCTOR ACTIVITY -7TH
3890 DATA CURRICULUM CONTENT - PRIMARY
3900 DATA CURRICULUM CONTENT - SECONDARY
3910 DATA TIME STOPPED (HHMM)
3920 DATA ALLOCATED TIME (MIN'S)
3930 DATA TIME STARTED REAL-TIME CODING
3940 DATA # OF REAL-TIME CODES
3950 FOR J=1 TO 7:READ LM$(J):NEXTJ
3960 DATA EW,EO,EC,ED,NI,NW,NO
3970 FOR J=0 TO 7:READ IM$(J):NEXTJ
3980 DATA NU,AM,AF,AQ,XN,XP,SD,TF
3990 FOR J=0 TO 2:READ FM$(J):NEXTJ
4000 DATA NU,TS,GR
4010 FOR J=1 TO 30:READ PJ%(J):NEXTJ
4020 DATA 0,0,0,0,1,0,0,0,5,7
4030 DATA 7,7,7,7,7,7,14,17,17,23
4040 DATA 23,23,23,23,23,23,30,30,0,0
4050 FOR J=1 TO 87:READ PJ$(J):NEXTJ
4060 DATA REGULAR,RESOURCE,SELF-CONTAINED,OTHER
4070 DATA SELF-PACED,OTHER-PACED
4080 DATA ORAL READING,SILENT READING,RECITING,LISTENING,DISCUSSING,WRITING,OTHE
R
4090 DATA EASY,MEDIUM,HARD,TEACHER,PEER,AIDE,SELF-INSTRUCTIONAL MATERIALS,TEACHI
NG MACHINE,NO INSTRUCTOR
4100 DATA LECTURING,DISCUSSING,PROMPTING,MODELING/DEMO,TESTING,SUPERVISING,OTHER
4110 DATA UD,UD,UD,UD,UD,UD,UD,UD,UD
4120 DATA DECODING/PHONICS,WORD STRUCTURE,WORD MEANING,COMPREHENSION,READING PRA
CTICE,SPELLING,GRAMMAR,COMPOSITION/CREATIVE WRITING,READING RELATED-OTHER,READIN
G BELOW TEST LEVEL
4130 DATA ADDITION/SUBTRACTION-NO REGROUPING,ADDITION/SUBTRACTION-REGROUPING,COM
```

```
PUTATIONAL TRANSFER,PLACE VALUE/NUMERALS,MULTIPLICATION,DIVISION,FRACTIONS/DECIM
ALS,SPATIAL APPLICTION,VERBAL APPLICATION,MATH RELATED-OTHER,MATH BELOW TEST LEV
EL
4140 DATA UD,UD,UD,UD,UD,UD,UD,UD,UD
4150 DATA PHYSICAL/BIOLOGICAL SCIENCES,SOCIAL SCIENCES,FOREIGN LANGUAGE,UD,UD,UD
,UD,UD,UD,UD,ART,MUSIC,TECHNOLOGICAL ARTS,PHYSICAL EDUCATION,PERCEPTUAL DEVELOPM
ENT,MANAGEMENT/PROCEDURAL,RECREATION/BREAK,PERSONAL EXPERIENCES/FEELINGS,OTHER
4160 GOTO760
4170 REM-TO LABEL A NEW DATA FILE XXXXX.YYYYYY
4180 GOSUB3020
4190 CLS:PRINT:PRINT" INSTRUCTIONS ON LABELING":PRINT" -----------------------"
:PRINT
4200 PRINT" A DATA FILE NEEDS A UNIQUE LABEL IN ORDER TO IDENTIFY":PRINT" IT FOR
 SUBSEQUENT USE.  THE LABEL, OR NAME, HAS TWO PARTS":PRINT" SEPARATED BY A PERIO
D.":PRINT
4210 PRINT" THE FIRST PART OF THE LABEL MUST BE ONE WORD CONSISTING":PRINT" OF N
O MORE THAN 8 CHARACTERS, WITH NO EMBEDDED BLANKS":PRINT" OR PERIODS OR SLASHES.
 THE FIRST CHARACTER CANNOT BE"
4220 PRINT" A NUMBER.":PRINT:GOSUB150
4230 CLS:PRINT:PRINT
4240 PRINT" THE SECOND PART OF THE LABEL (AFTER THE PERIOD) IS THE":PRINT" NAME
OF THE OBSERVATION SYSTEM WITH WHICH THE DATA FILE":PRINT" IS TO BE ASSOCIATED.
 THE TWO PARTS MUST BE SEPARATED"
4250 PRINT" BY A PERIOD.  E.G., 'MARCH4.PROBING' IS A VALID DATA":PRINT" FILE LA
BEL.  THE FIRST PART, MARCH4, UNIQUELY IDENTIFIES":PRINT" THE DATA FILE, AND THE
 REMAINDER INDICATES WHICH"
4260 PRINT" OBSERVATION SYSTEM IT BELONGS WITH.":PRINT:PRINT" WHAT IS THE LABEL
FOR YOUR NEW DATA FILE?":GOSUB 190
4270 IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$="" THEN 4190
4280 Z$=A$:GOSUB 4450 :IF CO%=-1 THEN 4190 :REM TO SPLIT LABELINTO 2 PARTS
4290 GOSUB 4340 :IF CO%=-1 THEN 4190
4300 B$=Z$:CLS:PRINT" IS ";B$;" THE NEW LABEL YOU WANT TO PERMANENTLY USE":PRINT
" FOR YOUR NEW DATA FILE?":GOSUB 190  :IF LEFT$(A$,1)=P$ THEN RETURN ELSE IF A$=
"" THEN 4300
4310 IF LEFT$(A$,1)<>"Y" THEN 4190
4320 CF$=CX$:DF$=Z$:NA%=0:TR%=0:TN$="UNSPECIFIED":CN$=TN$:DC$=TN$:DS=0:DE=0:GOSU
B1030 :GOSUB 2640
4330 FC%=FC%+1:FL$(FC%)=DF$:GOSUB3070 :RETURN
4340 REM-SUB TO TEST VALIDITY OF LABEL FOR TRSDOS FILE NAME
4350 CO%=-1:IF LEN(A$)>8 THEN 4440
4360 I=ASC(MID$(A$,1,1)):IF I>=48 AND I<=57 THEN 4420
4370 FOR J=1 TO LEN(A$):B$=MID$(A$,J,1):I=ASC(B$):IF (I>=48 AND I<=57) OR (I>=65
 AND I<=90) THEN NEXT J ELSE GOTO 4430
4380 FOR J=1 TO FC%:I=INSTR(FL$(J),P$):IF I>0 THEN B$=MID$(FL$(J),1,I-1) ELSE B$
=FL$(J)
4390 IF B$=A$ THEN 4410  ELSE NEXT J
4400 CO%=+1:PRINT:PRINT Z$;" IS A VALID AND UNIQUE FILE LABEL.":PRINT:RETURN
4410 CLS:PRINT:PRINT" A FILE WITH THIS LABEL ALREADY EXISTS - DUPLICATES":PRINT"
 ARE NOT ALLOWED.":GOSUB150  :GOSUB3110 :RETURN
4420 PRINT:PRINT" LABEL CANNOT BEGIN WITH A NUMBER -";LEFT$(A$,1):GOSUB 150  :RE
TURN
4430 PRINT:PRINT" LABEL HAS AN INVALID IMBEDDED CHARACTER = ";B$:GOSUB 150  :RET
URN
4440 PRINT:PRINT" LABEL HAS MORE THAN 8 CHARACTERS - NOT ACCEPTABLE":GOSUB 150
:RETURN
4450 CO%=-1:FOR J=1 TO LEN(A$):IF MID$(A$,J,1)=P$ THEN 4460  ELSE NEXT J:PRINT"*
** INVALID LABEL *** PERIOD IS MISSING.":GOSUB 150  :RETURN
```

```
4460 CX$=MID$(A$,J+1,LEN(A$)):A$=MID$(A$,1,J-1):FOR J=1 TO FC%:IF CX$=FL$(J) THE
N 4470  ELSE NEXT J:PRINT" *** ERROR *** ";CX$;" WAS NOT FOUND IN YOUR CATALOG A
S":PRINT" AN OBSERVATION SYSTEM LABEL":GOSUB 150  :RETURN
4470 CO%=1:PRINT:PRINTCX$;" IS A VALID OBSERVATION SYSTEM LABEL.":RETURN
```

SAMPLE DATA FILE

```
OBSERVATION SYSTEM - ALTOS
DATA FILE NAME - M12S01.ALTOS

TOTAL # OF ACTIVITIES = 16     TRANSITION TIME = 21

TARGET STUDENT NAME - TINA
CODER NAME - C.K. FOREMAN
COMMENTS - UNSPECIFIED

DAY START TIME: 827      DAY END TIME: 1400


 ******* IDENTIFICATION DATA *************************************

OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 1

TIME STARTED (HHMM) -                827
# STUDENTS IN SAME ACTIVITY  -       12
TS PACING -                          2  = OTHER-PACED
TS ACTIVITY (1 - 7) -                4  = LISTENING
TS TASK DIFFICULTY (1 - 3) -         1  = EASY
TS INSTRUCTOR (1 - 6) -              6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -        6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -       58  = OTHER
TIME STOPPED (HHMM) -                840
ALLOCATED TIME (MIN'S) -             13
 ******* IDENTIFICATION DATA *************************************

OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 2

TIME STARTED (HHMM) -                840
# STUDENTS IN SAME ACTIVITY  -       10
TS PACING -                          1  = SELF-PACED
TS ACTIVITY (1 - 7) -                6  = WRITING
TS ACTIVITY -2ND -                   2  = SILENT READING
TS TASK DIFFICULTY (1 - 3) -         1  = EASY
TS INSTRUCTOR (1 - 6) -              6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -        6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -       10  = DECODING/PHONICS
TIME STOPPED (HHMM) -                851
ALLOCATED TIME (MIN'S) -             11
```

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```
****** REAL-TIME CODING DATA ****** ACTIVITY # 2

TIME STARTED REAL-TIME CODING 840
# OF REAL-TIME CODES 12

 1  - ED SD GR
 2  - ED SD GR
 3  - EW NU NU
 4  - EW NU NU
 5  - EW NU NU
 6  - EW NU NU
 7  - EW NU NU
 8  - EW NU NU
 9  - EC NU NU
 10 - EW NU NU
 11 - NO NU NU
 12 - EW SD GR

  *** REAL-TIME CATEGORY SUMMARY ***

         (FOR THIS ACTIVITY)

        FREQUENCY       PERCENT
        ---------       -------

EW          8           66.6667
EO          0           0
EC          1           8.33333
ED          2           16.6667
NI          0           0
NW          0           0
NO          1           8.33333

NU          9           75
AM          0           0
AF          0           0
AQ          0           0
XN          0           0
XP          0           0
SD          3           25
TF          0           0

NU          9           75
TS          0           0
GR          3           25


 ******** IDENTIFICATION DATA ******************************************

OBSERVATION DATE (MMDDYY) -        31281
OBSERVER # -                       4
TEACHER # -                        14
TARGET STUDENT # -                 1
CLASS TYPE (1 - 4) -               4  = OTHER
CLASS SIZE (1 - 999) -             11
```

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```
 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 3
```

```
TIME STARTED (HHMM) -                    851
# STUDENTS IN SAME ACTIVITY  -           11
TS PACING -                              2  = OTHER-PACED
TS ACTIVITY (1 - 7) -                    3  = RECITING
TS ACTIVITY -2ND -                       1  = ORAL READING
TS TASK DIFFICULTY (1 - 3) -             2  = MEDIUM
TS INSTRUCTOR (1 - 6) -                  1  = TEACHER
INSTRUCTOR ACTIVITY (1 - 7) -            3  = PROMPTING
INSTRUCTOR ACTIVITY -2ND -               4  = MODELING/DEMO
CURRICULUM CONTENT - PRIMARY -           16  = GRAMMAR
TIME STOPPED (HHMM) -                    909
ALLOCATED TIME (MIN'S) -                 18

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 3

TIME STARTED REAL-TIME CODING 851
# OF REAL-TIME CODES 19

 1  - ED SD GR
 2  - ED SD GR
 3  - ED SD GR
 4  - ED SD GR
 5  - EO AQ GR
 6  - EO AQ GR
 7  - EO AQ GR
 8  - EC NU NU
 9  - EO AF TS
 10 - EC AF GR
 11 - EO AQ GR
 12 - ED AF GR
 13 - EC AF GR
 14 - EO AQ GR
 15 - EC AQ GR
 16 - EC-AF GR
 17 - EO AQ GR
 18 - EO AQ GR
 19 - EO AQ GR

  *** REAL-TIME CATEGORY SUMMARY ***

          (FOR THIS ACTIVITY)

       FREQUENCY       PERCENT
       ---------       -------

EW         0           0
EO         9           47.3684
EC         5           26.3158
ED         5           26.3158
MI         0           0
NW         0           0
NO         0           0

NU         1           5.26316
AM         0           0
AF         5           26.3158
AQ         9           47.3684
XN         0           0
XP         0           0
SD         4           21.0526
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```
 TF           0           0

 NU           1           5.26316
 TS           1           5.26316
 GR           17          89.4737

  ******* IDENTIFICATION DATA ****************************************

 OBSERVATION DATE (MMDDYY) -          31281
 OBSERVER # -                         4
 TEACHER # -                          11
 TARGET STUDENT # -                   1
 CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
 CLASS SIZE (1 - 999) -               12

  ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 4

 TIME STARTED (HHMM) -                910
 # STUDENTS IN SAME ACTIVITY  -     -99  ----MISSING DATA----
 TS PACING -                        -99  ----MISSING DATA----
 TS ACTIVITY (1 - 7) -              -99  ----MISSING DATA----
 TS TASK DIFFICULTY (1 - 3) -       -99  ----MISSING DATA----
 TS INSTRUCTOR (1 - 6) -            -99  ----MISSING DATA----
 INSTRUCTOR ACTIVITY (1 - 7) -      -99  ----MISSING DATA----
 CURRICULUM CONTENT - PRIMARY -     -99  ----MISSING DATA----
 TIME STOPPED (HHMM) -               1020
 ALLOCATED TIME (MIN'S) -            70

  ******* IDENTIFICATION DATA ****************************************

 OBSERVATION DATE (MMDDYY) -          31281
 OBSERVER # -                         4
 TEACHER # -                          11
 TARGET STUDENT # -                   1
 CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
 CLASS SIZE (1 - 999) -               12


  ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 5

 TIME STARTED (HHMM) -                1020
 # STUDENTS IN SAME ACTIVITY  -       1
 TS PACING -                          1  = SELF-PACED
 TS ACTIVITY (1 - 7) -                1  = ORAL READING
 TS ACTIVITY -2ND -                   6  = WRITING
 TS TASK DIFFICULTY (1 - 3) -         2  = MEDIUM
 TS INSTRUCTOR (1 - 6) -              3  = AIDE
 INSTRUCTOR ACTIVITY (1 - 7) -        3  = PROMPTING
 CURRICULUM CONTENT - PRIMARY -       13  = COMPREHENSION
 TIME STOPPED (HHMM) -                1050
 ALLOCATED TIME (MIN'S) -             30

  ****** REAL-TIME CODING DATA ****** ACTIVITY # 5

 TIME STARTED REAL-TIME CODING 1020
 # OF REAL-TIME CODES 29

  1  - ED SD TS
```

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```
  2  - EO AF TS
  3  - EO AF TS
  4  - EO AF TS
  5  - EO AF TS
  6  - EO AF TS
  7  - EO AF TS
  8  - EO AF TS
  9  - EO AF TS
 10  - EO AF TS
 11  - EO AM TS
 12  - EO AF TS
 13  - EO AM TS
 14  - NW NU NU
 15  - NW NU NU
 16  - EO AM TS
 17  - NI AF TS
 18  - ED SD TS
 19  - EO AF TS
 20  - EO AF TS
 21  - EO AM TS
 22  - EO AM TS
 23  - NW NU NU
 24  - NO NU NU
 25  - EO NU NU
 26  - NO NU NU
 27  - NO NU NU
 28  - ED NU NU
 29  - EW NU NU

   *** REAL-TIME CATEGORY SUMMARY ***

            (FOR THIS ACTIVITY)

         FREQUENCY       PERCENT
         ---------       -------

EW           1            3.44828
EO           18           62.069
EC           0            0
ED           3            10.3448
NI           1            3.44828
NW           3            10.3448
NO           3            10.3448

NU           9            31.0345
AM           5            17.2414
AF           13           44.8276
AO           0            0
XN           0            0
XP           0            0
SD           2            6.89655
TF           0            0

NU           9            31.0345
TS           20           68.9655
GR           0            0

 ******* IDENTIFICATION DATA ****************************************
```

```
OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 6

TIME STARTED (HHMM) -                1050
# STUDENTS IN SAME ACTIVITY  -      -99  ----MISSING DATA----
TS PACING -                         -99  ----MISSING DATA----
TS ACTIVITY (1 - 7) -               -99  ----MISSING DATA----
TS TASK DIFFICULTY (1 - 3) -        -99  ----MISSING DATA----
TS INSTRUCTOR (1 - 6) -             -99  ----MISSING DATA----
INSTRUCTOR ACTIVITY (1 - 7) -       -99  ----MISSING DATA----
CURRICULUM CONTENT - PRIMARY -      -99  ----MISSING DATA----
TIME STOPPED (HHMM) -                1135
ALLOCATED TIME (MIN'S) -             45

 ******* IDENTIFICATION DATA ************************************

OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 7

TIME STARTED (HHMM) -                1137
# STUDENTS IN SAME ACTIVITY  -       1
TS PACING -                          1  = SELF-PACED
TS ACTIVITY (1 - 7) -                1  = ORAL READING
TS ACTIVITY -2ND -                   2  = SILENT READING
TS ACTIVITY -3RD -                   6  = WRITING
TS TASK DIFFICULTY (1 - 3) -         2  = MEDIUM
TS INSTRUCTOR (1 - 6) -              6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -        6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -       12  = WORD MEANING
TIME STOPPED (HHMM) -                1147
ALLOCATED TIME (MIN'S) -             10

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 7

TIME STARTED REAL-TIME CODING 1137
# OF REAL-TIME CODES 10

 1  - EW NU NU
 2  - EW AN TS
 3  - EW NU NU
 4  - EW NU NU
 5  - NI AF TS
 6  - EO AQ TS
 7  - EW NU NU
 8  - ED NU NU
 9  - EW NU NU
```

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```
 10 - EO NU NU

  *** REAL-TIME CATEGORY SUMMARY ***

           (FOR THIS ACTIVITY)

        FREQUENCY       PERCENT
        ---------       -------

EW          6           60
EO          2           20
EC          0           0
ED          1           10
NI          1           10
NW          0           0
NO          0           0

NU          7           70
AM          1           10
AF          1           10
AO          1           10
XN          0           0
XP          0           0
SD          0           0
TF          0           0

NU          7           70
TS          3           30
GR          0           0

 ******* IDENTIFICATION DATA ****************************************

OBSERVATION DATE (MMDDYY) -         31281
OBSERVER # -                        4
TEACHER # -                         11
TARGET STUDENT # -                  1
CLASS TYPE (1 - 4) -                3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -              12

 ******* EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 8

TIME STARTED (HHMM) -               1147
# STUDENTS IN SAME ACTIVITY  -      12
TS PACING -                         2  = OTHER-PACED
TS ACTIVITY (1 - 7) -              -99  ----MISSING DATA----
TS TASK DIFFICULTY (1 - 3) -       -99  ----MISSING DATA----
TS INSTRUCTOR (1 - 6) -            -99  ----MISSING DATA----
INSTRUCTOR ACTIVITY (1 - 7) -       6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -      56  = RECREATION/BREAK
TIME STOPPED (HHMM) -               1225
ALLOCATED TIME (MIN'S) -            38

 ******* IDENTIFICATION DATA ****************************************

OBSERVATION DATE (MMDDYY) -         31281
OBSERVER # -                        4
TEACHER # -                         11
TARGET STUDENT # -                  1
```

```
CLASS TYPE (1 - 4) -                      3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -                    12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 9

TIME STARTED (HHMM) -                     1230
# STUDENTS IN SAME ACTIVITY  -            1
TS PACING -                               1  = SELF-PACED
TS ACTIVITY (1 - 7) -                     6  = WRITING
TS ACTIVITY -2ND -                        2  = SILENT READING
TS TASK DIFFICULTY (1 - 3) -              1  = EASY
TS INSTRUCTOR (1 - 6) -                   6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -             6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -            10  = DECODING/PHONICS
TIME STOPPED (HHMM) -                     1237
ALLOCATED TIME (MIN'S) -                  7

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 9

TIME STARTED REAL-TIME CODING 1230
# OF REAL-TIME CODES 8

 1  - EC NU NU
 2  - EW NU NU
 3  - NO NU NU
 4  - EW NU NU
 5  - ED SD TS
 6  - EW NU NU
 7  - EW NU NU
 8  - EW NU NU

  *** REAL-TIME CATEGORY SUMMARY ***

          (FOR THIS ACTIVITY)

        FREQUENCY      PERCENT
        ---------      -------

EW          5          62.5
EO          0          0
EC          1          12.5
ED          1          12.5
NI          0          0
NW          0          0
NO          1          12.5

NU          7          87.5
AM          0          0
AF          0          0
AO          0          0
XN          0          0
XP          0          0
SD          1          12.5
TF          0          0

NU          7          87.5
TS          1          12.5
GR          0          0
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 ******* IDENTIFICATION DATA ***************************************

OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12

 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 10

TIME STARTED (HHMM) -                1239
# STUDENTS IN SAME ACTIVITY  -       1
TS PACING -                          1  = SELF-PACED
TS ACTIVITY (1 - 7) -                2  = SILENT READING
TS ACTIVITY -2ND -                   6  = WRITING
TS TASK DIFFICULTY (1 - 3) -         1  = EASY
TS INSTRUCTOR (1 - 6) -              6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -        6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -       13  = COMPREHENSION
TIME STOPPED (HHMM) -                1242
ALLOCATED TIME (MIN'S) -             3

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 10

TIME STARTED REAL-TIME CODING 1239
# OF REAL-TIME CODES 4

 1  - EC NU NU
 2  - EO NU NU
 3  - EW NU NU
 4  - EW NU NU

  *** REAL-TIME CATEGORY SUMMARY ***

          (FOR THIS ACTIVITY)

       FREQUENCY       PERCENT
       ---------       -------

EW          2          50
EO          1          25
EC          1          25
ED          0          0
NI          0          0
NW          0          0
NO          0          0

NU          4          100
AM          0          0
AF          0          0
AO          0          0
XN          0          0
XP          0          0
SD          0          0
TF          0          0

NU          4          100
```

```
TS          0           0
GR          0           0


 ******* IDENTIFICATION DATA ************************************

OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 11

TIME STARTED (HHMM) -                1243
# STUDENTS IN SAME ACTIVITY  -       1
TS PACING -                          1  = SELF-PACED
TS ACTIVITY (1 - 7) -                1  = ORAL READING
TS ACTIVITY -2ND -                   6  = WRITING
TS TASK DIFFICULTY (1 - 3) -         1  = EASY
TS INSTRUCTOR (1 - 6) -              6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -        6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -       12  = WORD MEANING
TIME STOPPED (HHMM) -                1247
ALLOCATED TIME (MIN'S) -             4

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 11

TIME STARTED REAL-TIME CODING 1243
# OF REAL-TIME CODES 5

 1  - EC NU NU
 2  - EW NU NU
 3  - EW NU NU
 4  - EW NU NU
 5  - EW NU NU

  *** REAL-TIME CATEGORY SUMMARY ***

          (FOR THIS ACTIVITY)

       FREQUENCY      PERCENT
       ---------      -------

EW          4           80
EO          0           0
EC          1           20
ED          0           0
NI          0           0
NW          0           0
NO          0           0

NU          5           100
AM          0           0
AF          0           0
AO          0           0
XN          0           0
XP          0           0
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SD          0           0
TF          0           0

NU          5           100
TS          0           0
GR          0           0


 ******* IDENTIFICATION DATA ***********************************

OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 12

TIME STARTED (HHMM) -                1247
# STUDENTS IN SAME ACTIVITY  -       1
TS PACING -                          1  = SELF-PACED
TS ACTIVITY (1 - 7) -                6  = WRITING
TS ACTIVITY -2ND -                   2  = SILENT READING
TS TASK DIFFICULTY (1 - 3) -         1  = EASY
TS INSTRUCTOR (1 - 6) -              6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -        6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -       18  = READING RELATED-OTHER
TIME STOPPED (HHMM) -                1252
ALLOCATED TIME (MIN'S) -             5

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 12

TIME STARTED REAL-TIME CODING 1246
# OF REAL-TIME CODES 6

 1  - EC NU NU
 2  - EW NU NU
 3  - EW NU NU
 4  - EW NU NU
 5  - EW NU NU
 6  - EW NU NU

  *** REAL-TIME CATEGORY SUMMARY ***

          (FOR THIS ACTIVITY)

        FREQUENCY       PERCENT
        ---------       -------

EW          5           83.3333
EO          0           0
EC          1           16.6667
ED          0           0
NI          0           0
NW          0           0
NO          0           0

NU          6           100
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```
AM          0          0
AF          0          0
AQ          0          0
XN          0          0
XP          0          0
SD          0          0
TF          0          0

NU          6          100
TS          0          0
GR          0          0


 ******* IDENTIFICATION DATA *************************************

OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 13

TIME STARTED (HHMM) -                1254
# STUDENTS IN SAME ACTIVITY  -      -99  ----MISSING DATA----
TS PACING -                         -99  ----MISSING DATA----
TS ACTIVITY (1 - 7) -                2  = SILENT READING
TS ACTIVITY -2ND -                   6  = WRITING
TS TASK DIFFICULTY (1 - 3) -         1  = EASY
TS INSTRUCTOR (1 - 6) -              6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -        6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -       25  = DIVISION
TIME STOPPED (HHMM) -                1300
ALLOCATED TIME (MIN'S) -             6

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 13

TIME STARTED REAL-TIME CODING 1254
# OF REAL-TIME CODES 5

 1  - EC NU NU
 2  - EW NU NU
 3  - EW NU NU
 4  - EW NU NU
 5  - EW NU NU

  *** REAL-TIME CATEGORY SUMMARY ***

          (FOR THIS ACTIVITY)

       FREQUENCY        PERCENT
       ---------        -------

EW          4          80
EO          0          0
EC          1          20
ED          0          0
NI          0          0
```

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```
NW          0          0
NO          0          0

NU          5          100
AM          0          0
AF          0          0
AQ          0          0
XN          0          0
XP          0          0
SD          0          0
TF          0          0

NU          5          100
TS          0          0
GR          0          0


 ******* IDENTIFICATION DATA ***********************************

OBSERVATION DATE (MMDDYY) -           31281
OBSERVER # -                          4
TEACHER # -                           11
TARGET STUDENT # -                    1
CLASS TYPE (1 - 4) -                  3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -                12


 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 14

TIME STARTED (HHMM) -                 1305
# STUDENTS IN SAME ACTIVITY  -        6
TS PACING -                           2  = OTHER-PACED
TS ACTIVITY (1 - 7) -                 4  = LISTENING
TS ACTIVITY -2ND -                    6  = WRITING
TS ACTIVITY -3RD -                    1  = ORAL READING
TS TASK DIFFICULTY (1 - 3) -          3  = HARD
TS INSTRUCTOR (1 - 6) -               3  = AIDE
INSTRUCTOR ACTIVITY (1 - 7) -         5  = TESTING
INSTRUCTOR ACTIVITY -2ND -            6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -        40  = PHYSICAL/BIOLOGICAL SCIENCES
CURRICULUM CONTENT - SECONDARY -      12  = WORD MEANING
TIME STOPPED (HHMM) -                 1316
ALLOCATED TIME (MIN'S) -              11

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 14

TIME STARTED REAL-TIME CODING 1305
# OF REAL-TIME CODES 12

 1  - ED SD GR
 2  - EO AF GR
 3  - EO AF GR
 4  - ED SD GR
 5  - EW AQ GR
 6  - EW AQ GR
 7  - NI AQ GR
 8  - EW AQ GR
 9  - EW AQ GR
 10 - EW AQ GR
 11 - EW AQ GR
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  12 - NI AQ GR

   *** REAL-TIME CATEGORY SUMMARY ***

           (FOR THIS ACTIVITY)

          FREQUENCY        PERCENT
          ---------        -------

EW             6           50
EO             2           16.6667
EC             0           0
ED             2           16.6667
NI             2           16.6667
NW             0           0
NO             0           0

NU             0           0
AM             0           0
AF             2           16.6667
AQ             8           66.6667
XN             0           0
XP             0           0
SD             2           16.6667
TF             0           0

NU             0           0
TS             0           0
GR             12          100

 ******* IDENTIFICATION DATA ***************************************

OBSERVATION DATE (MMDDYY) -          31281
OBSERVER # -                         4
TEACHER # -                          11
TARGET STUDENT # -                   1
CLASS TYPE (1 - 4) -                 3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -               12

 ****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 15

TIME STARTED (HHMM) -                1319
# STUDENTS IN SAME ACTIVITY  -       1
TS PACING -                          1  = SELF-PACED
TS ACTIVITY (1 - 7) -                6  = WRITING
TS ACTIVITY -2ND -                   2  = SILENT READING
TS TASK DIFFICULTY (1 - 3) -         2  = MEDIUM
TS INSTRUCTOR (1 - 6) -              6  = NO INSTRUCTOR
INSTRUCTOR ACTIVITY (1 - 7) -        6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -       25  = DIVISION
TIME STOPPED (HHMM) -                1337
ALLOCATED TIME (MIN'S) -             18

 ****** REAL-TIME CODING DATA ****** ACTIVITY # 15

TIME STARTED REAL-TIME CODING 1319
# OF REAL-TIME CODES 20
```

```
 1  - EW NU NU
 2  - EW NU NU
 3  - NI NU NU
 4  - NO TF GR
 5  - NO TF GR
 6  - NO TF GR
 7  - NO TF GR
 8  - NO TF GR
 9  - NO TF GR
 10 - EW NU NU
 11 - EW NU NU
 12 - EW NU NU
 13 - EW NU NU
 14 - EW NU NU
 15 - EW NU NU
 16 - EW NU NU
 17 - EW NU NU
 18 - EW NU NU
 19 - EW NU NU
 20 - ED SD GR

  *** REAL-TIME CATEGORY SUMMARY ***

           (FOR THIS ACTIVITY)

       FREQUENCY        PERCENT
       ---------        -------

EW          12          60
EO          0           0
EC          0           0
ED          1           5
NI          1           5
NW          0           0
NO          6           30

NU          13          65
AM          0           0
AF          0           0
AQ          0           0
XN          0           0
XP          0           0
SD          1           5
TF          6           30

NU          13          65
TS          0           0
GR          7           35

 ******* IDENTIFICATION DATA ***************************************

OBSERVATION DATE (MMDDYY) -           31281
OBSERVER # -                          4
TEACHER # -                           11
TARGET STUDENT # -                    1
CLASS TYPE (1 - 4) -                  3  = SELF-CONTAINED
CLASS SIZE (1 - 999) -                12
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****** EDUCATIONAL ACTIVITY DATA ******  ACTIVITY # 16

TIME STARTED (HHMM) -                  1337
# STUDENTS IN SAME ACTIVITY  -          12
TS PACING -                             2  = OTHER-PACED
TS ACTIVITY (1 - 7) -                 -99  ----MISSING DATA----
TS TASK DIFFICULTY (1 - 3) -          -99  ----MISSING DATA----
TS INSTRUCTOR (1 - 6) -               -99  ----MISSING DATA----
INSTRUCTOR ACTIVITY (1 - 7) -           6  = SUPERVISING
CURRICULUM CONTENT - PRIMARY -          56  = RECREATION/BREAK
TIME STOPPED (HHMM) -                  1400
ALLOCATED TIME (MIN'S) -                23

   *** REAL-TIME CATEGORY SUMMARY ***

           (FOR ALL ACTIVITIES)

        FREQUENCY        PERCENT
        ---------        -------

EW          53           40.7692
EO          32           24.6154
EC          11           8.46154
ED          15           11.5385
NI          5            3.84615
NW          3            2.30769
NO          11           8.46154

NU          66           50.7692
AM          6            4.61538
AF          21           16.1538
AQ          18           13.8462
XN          0            0
XP          0            0
SD          13           10
TF          6            4.61538

NU          66           50.7692
TS          25           19.2308
GR          39           30
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APPENIDX F

ALT TEACHER'S MANUAL

Teacher's Manual:

TEACHING STRATEGIES FOR INCREASING ACADEMIC LEARNING TIME AND STUDENT ACADEMIC ACHIEVEMENT

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INTRODUCTION

Recently, a substantial number of educational studies have sought to identify activities which significantly impact on student achievement. The results of these studies have produced virtual universal agreement that Academic Learning Time (ALT) is one of the most significant determinants of student achievement. ALT refers generally to the time students spend actively engaged in academic tasks which they complete with high success. It contains three components that have been found to be highly related to student achievement: 1) Amount of time allocated to instruction, 2) Amount of time that students are actually engaged in academic activities, and 3) Amount of time that students are engaged in academic activities completed with high success.

Allocated time. The amount of time allocated by a school district and/or a teacher for instruction has been found to be an important predictor of student achievement. Some studies have demonstrated that the length of the school day and the length of the school calendar influence student achievement. Other studies have found that the more time that a teacher allocates to a subject matter area, the greater the level of student achievement. Further studies have systematically examined the amount of time that is actually allocated for instruction in typical classrooms. The results indicated that in selected second grade classrooms 57% of the school day was allocated to academic activities, with 24% devoted to non-academic subjects such as music, art, affective and physical education, and the remaining 19% was spent in transitional activities. Fifth grade pupils had 60% of their time allocated to academic activities, 23% to non-academic activities, and 17% to transitional activities. This information suggests that room exists for increasing the amount of time that is allocated for instruction. We also know that, should this occur, it is likely that student achievement will increase.

Engagement time. The second component of ALT is the proportion of allocated time that students are actively engaged in academic tasks. Student engagement time was found to be even more highly related to student achievement than allocated time. These results suggest that students who pay attention to and work more on academic tasks are also those who learn more. Studies that have examined the amount of time that students are engaged during the school day have reported results ranging from 40 to 80%. Information reported by most authorities suggests that at least 80% engagement is optimum for most students.

Success time. The final component of ALT is student success rate on academic tasks. Studies have clearly indicated that the more time that students spend on tasks which they complete with high success, the greater their level of achievement. These studies reveal that pupils who spend more than half of their time on high success tasks (i.e., tasks on which students attain accuracy scores of 80% or higher) also attain higher achievement test scores, maintain their knowledge longer, and have more positive attitudes toward learning. Such results suggest that learning basic skills in the elementary grades requires students to experience success on assigned tasks and to thoroughly master skills.

Academic success and skill mastery depend very heavily upon accurate instructional programming. Studies have demonstrated that high student achievement is related to teacher ability to accurately assess students' academic skills and to provide appropriate and adequate instructional activities. Although, on the surface, this observation represents nothing new--practicioners have forever diagnosed students' needs and prescribed instruction--successful results depend on the manner in which the assessment, programming and instruction are conducted. The most compelling evidence indicates that, to maximize a student's success on a particular academic task, a teacher should first assess a student's ability to perform the task, provide materials or procedures to directly teach it, and then regularly monitor student progress on the task. Such systems provide feedback to students regarding their performance, as well as to the teacher concerning the effectiveness of the instructional programs.

Question: Given the above information, what can you as a teacher specifically do to increase the academic achievement of the students in your classroom? Answer: Read the subsequent sections of this manual for specific suggestions on how to increase student academic achievement.

TEACHING STRATEGIES THAT INCREASE STUDENT ACADEMIC ACHIEVEMENT

What can you, the teacher, do to increase student academic achievement in your classroom? Studies conducted in thousands of classrooms in the U.S. have identified a number of specific things that more effective teachers do that are associated with greater academic achievement:

- Spend more time on academic subjects,
- Evoke more student attention to academic tasks,
- Provide more direct academic instruction,
- Provide more academic activities in which students experience high task success.

In many ways these four areas overlap and are interrelated. But the message is clear from the educational studies over the last decade: What is not taught and attended to in academic areas is not learned. Teachers who are task oriented and determined that their students learn are more effective.

We now want to discuss in concrete terms what it is that these effective teachers do. Hopefully, none of these recommendations will surprise you. As you read, think about your classroom and students. Ask yourself, "How many of these things do I frequently do in my classroom? What could I do differently that would increase my teaching effectiveness?"

SPEND MORE TIME ON ACADEMIC SUBJECTS

Your immediate response may be, "But my daily schedule is already full. How can I allocate *more* time for academic subjects?". Before we try to answer this question, consider this: Studies show that the more time spent and the more content covered in a subject matter area, the more students achieve in that content area. This should not be surprising. But what *is* surprising is the *tremendous variability* in the amount of time that teachers allocate to various content areas. In some elementary classrooms, for example, students were observed to spend an average of *less than one minute per day* in reading instruction, compared to other classrooms where students spent an average of *more than two and a half hours per day*! Sounds incredible, but that's what was observed. Of course, these are extreme cases.

One strategy for allocating more time to academics is for a teacher to look at the difference between *scheduled* time and *allocated* time. For example, a teacher may schedule math from 11:00 a.m. to 11:40 a.m. each day (40 minutes per day). However, by the time the kids arrive from their physical education class and get settled, the math activity doesn't really get started until about 11:10. Subtract 10 minutes. During the lesson, several students become disruptive and start pencil jabbing. The teacher stops them and interrupts the class to give a short lecture on the dangers of pencil jabbing. Subtract 5 more minutes. Then, by about 11:30 most of the students have finished the math assignment. The teacher tells them, "Since it's so close to lunch time, you have 10 minutes of free time." Subtract 10 more minutes.

In this example, which is probably not atypical, forty minutes were scheduled for math, but only 15 minutes were actually spent in math instruction. This example also illustrates three causes of decreased instruction time:

1) Time spent in transition between activities,

2) Time spent disciplining or managing student misbehavior,

3) Time students spend waiting during a scheduled activity.

Without changing your schedule, you can increase time spent in academic content areas by decreasing total transition time, student misbehavior and student wait time. You can also increase time spent in specific academic content areas by scheduling more time for those subjects.

1. Transition time. In our studies we found that students spent an average of about 45 minutes per day in total transition time. This is the time that accumulates during the school day between the end of one activity and the beginning of the next activity. In some classrooms there was as little as 25 minutes of transition time on a given day, and in others as much as 90 minutes. Of course, some transition time is inevitable.

PROJECT ONE: Here's a little project for you to do: Make a copy of your weekly schedule of activities, including lunch, recess, collecting lunch money, taking attendance, etc., as well as the usual subject areas such as reading, spelling, math, science, social studies, art, music, and P.E. For one week, write down on your schedule the exact clock times that each activity actually begins and ends. An activity begins when your students actually start dealing with the directions or substance of the learning activity. Likewise, an activity ends when your students actually stop dealing with the content of the learning activity. Keep a record of these activity start and stop times for a week. At the end of the week, add up the time intervals between activities (i.e., transition time). Divide by five to get the average amount of transition time per day.

If you're like most teachers when you complete PROJECT ONE, you may be surprised at how quickly transition time accumulates. Think of it this way: If you can decrease transition time by 15 minutes per day, then over the course of a 180-day school year, you will have 45 more hours to spend on instruction.

How can you reduce transition time? There are many ways. Here are two:

Make sure that all necessary lesson materials and supplies are assembled beforehand and are near at hand for both you and your students.

Start an activity promptly. Don't wait for stragglers. At first some "foot draggers" may miss out on the beginning of a lesson, but they'll soon get the message that you mean business.

Some teachers feel that transitions between activities provide respite for students—i.e., "break time". We agree that some break time is necessary, since it is unrealistic for students to concentrate continuously all day long. In elementary schools, morning and afternoon recesses and lunch help fulfill the need for break time. However, when the transition time between school and classroom activities which accumulates during the day becomes greater than the time spent on an important academic subject area, a teacher should evaluate ways of reducing transition time and increasing instructional time.

2. Time spent disciplining. Obviously, the more student off-task behavior there is, and the more time you need to spend disciplining or managing it, the less time there is available for instruction and learning. There are hundreds of methods of dealing with misbehavior, but research has not shown any method to be always superior to all others. In a famous study by Jacob Kounin, he discovered that the specific type of classroom behavior management technique was not nearly as important as its correct targeting and timing. He coined a term, "withitness", to describe teacher disciplining which has correct targeting and timing. Withitness promotes high student task involvement and minimal misbehavior. Teachers who are "withit" continually monitor their classrooms for potential behavior problems, and they communicate to their students that they know what's going on. If there is a misbehavior, a "withit" teacher correctly identifies misbehaving students (correct targeting) and deals with it immediately (correct timing).

Teachers who make target errors may discipline the "wrong" student (one who is innocent, an onlooker, or an imitator), or deal with a less serious misbehavior when a more serious misbehavior is occurring. A timing error occurs when the misbehavior "spreads" to other students or increases in seriousness before the teacher does something about it.

Thus, one effective way to minimize student misbehavior is to be "withit" in classroom behavior management. When less student misbehavior occurs, more time can be spent on the content of the lesson.

Another method, which has successfully increased the amount of appropriate student behavior and diminished inappropriate behavior, is to praise students periodically for paying attention and for behaving appropriately. For example, a teacher might periodically look around the classroom while conducting a reading group to identify and verbally praise students who are behaving appropriately. This practice has two distinct advantages. First, it provides teacher attention to students who are behaving appropriately, thus reinforcing that behavior, and secondly, those students are presented as socially acceptable models for other members of the class to emulate.

3. Time students spend waiting. In our study students were observed to spend an average total of about 19 minutes per day waiting during activities. This means that they were either finished with their work early, or they could not continue working because they were waiting on the teacher or someone else in order to continue. Over the course of a 180-day school year, that adds up to

approximately 55 hours spent waiting. Note that wait time does not include time spent in transition between activities.

Of course, some student waiting is inevitable. For example, if a student is stuck on an assignment and needs help, it may be serveral minutes before you can get free to help that student. On the other hand, when some students finish an assignment early, you can simply prepare in advance similar additional work for those faster working students. You could have a folder or file of "bonus" assignments or "challengers" that students know they can do if they finish the original assignment early. If possible, these extra tasks should be clearly related to the objectives of the original assignment.

Another common example of student wait time occurs when elementary students stand in line at the teacher's desk waiting to get their papers graded. A couple of ways you can decrease this kind of wait time is to: 1) Provide answer sheets so that students can correct their own papers after they are finished. 2) Correct papers afterwards as a group activity (and you can spot check answer sheets occasionally). Students can exchange papers if you're concerned about cheating. Needless to say, these strategies will not be suitable for some assignments, but you can decrease wait time using these strategies on assignments which are suitable.

4. Scheduling. You should not overlook the possibility of scheduling more time for certain kinds of academic activites. Of course, there will be trade-offs in time scheduled for other activities, since the total amount of time per day is fixed by school hours. For example, scheduling 10 more minutes per day for reading instruction adds up to 30 extra hours of time allocated to reading over the course of a school year. You might think that, when allocated time is increased, student attention will tend to decrease. Studies have shown, however, that this does not generally happen. When time allocated to a particular content

area is increased, total student engagement time in that content area also increases.

Another way to beef up your schedule is to include, for example, more reading, writing, and math related activities in other subject areas, such as science and social studies. Students can get practice in the basic skills while they are learning other content as well.

Summary. You can increase the amount of time spent in instruction on academic content areas by:

- Reducing transition time between activities,
- Decreasing student misbehavior and time spent disciplining,
- Decreasing student wait time during activities,
- Increasing time scheduled for those content areas.

EVOKE MORE STUDENT ATTENTION TO ACADEMIC TASKS

Even though you have maximized allocated instructional time, some students may have relatively low task engagement rates. For example, Jimmy may pay attention about 60% of the time, whereas Sally is usually on-task 80% of the time. These task engagement rates are not uncommon. On the average, most students pay attention to academic learning activities between 70 and 75% of the time.

Studies have shown that increased student engagement time in academic content areas is associated with greater achievement in those areas. Again, it doesn't take long for small differences in daily engagement time to add up. For example, suppose you have scheduled and spend 90 minutes in reading instruction per day. If a student is engaged 70% of the time, his/her engagement time in reading is 70% X 90 minutes, or 63 minutes per day on the average. If that same student were to increase his/her engagement rate to 80%, then total engagement time would be 72 minutes per day. You may say, "Nine more minutes of student engagement per day doesn't sound like much." But consider that this is equivalent to 27 more hours of student engagement time in reading over the course of a school year. Looking at it another way, at a 70% engagement rate, about 5 extra weeks of school would be required to equal the total amount of engagement time a child would accrue at an 80% engagement rate during the normal school year.

What can you do to increase student attention? Of course, some factors are often beyond your direct control, such as student motivation to learn, student fatigue (due to not enough sleep, poor diet or health, low blood sugar), the humidity and temperature in the classroom, etc. There are other things you can control, however:

- Praising students for appropriate behavior,
- Being "withit",
- Doing more groupwork and providing more direct instruction,
- Providing a variety of learning tasks,
- Supervising seatwork activities more closely.

Praising students for appropriate behavior. Many studies have demonstrated that teacher praise provided to students who are working diligently on their assignments served to increase student engagement. This technique was found to work even more effectively when it was combined with ignoring off-task behavior. Later studies found that the positive effects of this technique also spilled over to students seated adjacent to the target students. Unfortunately, this technique is frequently overlooked because of its simplicity. But the point remains that it has been found to be one of the most effective techniques for increasing student engagment. In addition, many other studies have been conducted that demonstrate that point systems are very effective devices for increasing student engagement.

Being "withit". As discussed above, teachers who are more "withit" have classrooms whose students are on-task a greater proportion of the time and misbehave less often. Being "withit" means that you have "eyes in the back of your head" and communicate to your students that you are aware of what each student is doing. A "withit" teacher deals with off-task student behavior with correct targeting and timing. A positive form of "withitness" is to be aware of students who are actively engaged with the task, and praise those students. Studies have shown that teachers have been able to successfully increase student task engagement rates by regularly scanning their classrooms (e.g., once every five minutes), identifying those students who are on-task, and then providing some kind of reinforcement to those students.

Doing more groupwork. Studies have shown that students generally pay more attention during teacher-led group activities, compared to independent seatwork activities. We believe that the major reason for this increased student engagement is that more direct instruction is usually provided during teacher-led group activities. In our study we found that any given student was on-task an average of 95% of the time when direct instruction was being provided--either specifically to that student, to another student in the group, or to the group as a whole. On the other hand, when no direct instruction was being provided to the student or group including the student, s/he was engaged about 58% of the time on the average. Another way of looking at this, students were 8 times more likely to be off-task when no direct instruction was being provided, compared to their off-task behavior when there was direct instruction. Direct instruction includes teacher feedback, questioning, explaining, and structuring/directing. More will be said about direct instruction in a later section.

Studies have indicated that 30 to 40% of the time is typically devoted to teacher-led group activities at the elementary level, and about 60 to 70% of the time is spent in independent seatwork activities. Thus, one way to increase student attention is to schedule more group activities and therefore less independent seatwork. If you do more group activities, you will automatically increase the amount of direct instruction that you provide. This will result in increased student attention and, in the long run, greater gains in academic achievement.

A concrete way to go about increasing the number of group activities is to consider one activity per day that you have scheduled for seatwork (e.g., a language arts or math worksheet). Then, think of a practical way to convert that seatwork content into a group activity. By doing just one more group activity per day (and one less seatwork activity), we have estimated that total engagement time per student would increase by about 21 hours over the course of a school year—that's just for one more 20-minute teacher-led group activity per day.

Several caveats are in order here: First, increasing groupwork does not imply that seatwork should be excluded. Students obviously do need time to work by themselves at their own pace during certain stages of learning. Second, student skill levels must be taken into account in groupwork. If the students in the group are too divergent in their skill levels, doing an activity in one large group may be counterproductive, and it may be best to group students according to ability and instruct them in a group, while students who could not profit from this type of instruction are assigned seatwork. Third, it is worthwhile to consider the reasons why students are off-task more often during seatwork. Part of their inattention can be attributed to the nature of teacher supervision of seatwork. (More will be said about this in a later section.) A more important reason may be that the tasks required during seatwork may not be very interesting to students or instructions are unclear. Much seatwork at the elementary level consists of worksheet or workbook activities. In effect, this format requires that students do a great deal of "pencil pushing". It may be worthwhile to consider other kinds of independent seatwork formats besides worksheets.

Providing a variety of learning tasks. More variety of activities during a lesson is associated with higher student engagement rates and achievement gains, according to the results of classroom observational research. If there is little variety in classroom learning tasks, students will find ways to introduce variety themselves--often this will be in the form of off-task behavior. The old adage, "variety is the spice of life," applies to learning as well. In light of the above discussion, one simple way to introduce variety is by alternating group and seatwork activities. In our study we observed a teacher who did not do this.

She typically scheduled entire mornings with mostly seatwork activities and the afternoons were devoted primarily to groupwork. Predictably, we observed a lot of off-task behavior in the mornings. By simply alternating seatwork and groupwork throughout the day, this teacher could have substantially increased student engagement time.

Furthermore, studies have shown that student engagement is higher during a seatwork activity which immediately follows a group activity, than it is during a seatwork activity which follows a previous seatwork activity.

Other ways to increase variety can be achieved after careful consideration of the types of tasks that students are expected to perform--i.e., the content of the tasks and the kinds of responses students are required to make. Think about varying from task to task the sensory modalities used (i.e., seeing, hearing, smelling, touching, tasting) and the kinesthetic requirements.

Supervising seatwork activites more closely. Studies have shown that student attention is higher during seatwork when there is more active supervision. Active supervision means that the teacher circulates among the class, monitoring the progress of student work, occasionally providing encouragement and specific feedback to students, and providing assistance to students when needed.

If you are working with another group at the time, you can position yourself so that you can keep an eye on the students in seatwork. Kounin identified a teacher behavior that he termed, "overlapping", which refers to teacher manifestation of attention to more than one student or activity at the same time. For example, suppose you are working with a small reading group and you notice that Cindy (in seatwork) has just gone off-task. Without interrupting your small group, you look up and quickly praise Cindy's neighbor Mary for paying attention. Then if you note that Cindy has returned to task, she could be praised. At the same time, you have not disrupted the flow of your reading group. Or suppose that Edward (also in seatwork) comes to you for help while you are conducting the reading group. You briefly assist Edward, while at the same time keeping the reading group going. These are examples of teacher "overlapping". Teachers who "overlap" more often have classrooms with higher student task involvement.

Thus, when the whole class is doing seatwork, you can actively supervise by circulating and monitoring. If part of the class is doing seatwork and the remainder are in a group you are leading, you can actively supervise by "overlapping". Obviously, you don't want to overdo active supervision to the extent that it disrupts student attention to task or makes students feel nervous about being observed. On the other hand, if students know they're not being closely supervised during seatwork, they are more likely to be off-task. Let them know that you are aware of what they're doing and that you're trying to help them learn. This will help increase student attention during seatwork.

Summary. There are at least five things you can do to increase student attention:

- Praising students for appropriate behavior,
- Being "withit",
- Doing more group and less seatwork activities,
- Providing a variety of learning tasks,
- Supervising seatwork activities more closely.

PROVIDE MORE DIRECT ACADEMIC INSTRUCTION

We have defined 'direct academic instruction' as interaction with students on the substance or directions of an academic task. Research studies have found that more direct instruction in academic content areas is associated with greater student achievement gains in those academic areas. Teachers who engage in more direct academic instruction tend to lead more group activities, as discussed above, although direct academic instruction can also occur in seatwork settings with individual students. Direct academic instruction includes:

- Feedback,
- Questioning,
- Explaining/modeling,
- Structuring/directing.

Academic feedback. This occurs whenever the student is informed of the correctness or incorrectness of his/her response(s) on the substance of an academic task. Note that, while the teacher is often the source, feedback to a student can also come from the learning materials themselves, a peer, an aide, or an instructional device such as a computer. Research has generally indicated that more academic feedback is associated with greater gains in achievement.

Obviously, feedback is important, for without it, how would students know that they have correctly learned? Also important is the timing of feedback. Studies have shown that the more immediately feedback is given, the more rapidly learning occurs. Immediate feedback is particularly crucial when students are initially learning to do a completely new task.

Feedback is basically either positive or negative. Examples of positive feedback are "That's right.", "Yes.", "Good.", "Correct.", "You got them all right!", etc. Positive feedback is especially important with low-achieving, disadvantaged, and mildly handicapped children, as well as students from low socioeconomic backgrounds (low SES). Examples of negative feedback are "No.", "That's not right.", "Wrong.", "Try again.", "You missed three problems on the assignment.", etc. Negative feedback should be minimized with low-achieving, disadvantaged, mildly handicapped, and low SES students. On the other hand, studies seem to indicate that high-achieving students tend to be more tolerant of negative feedback, and if used judiciously, it can enhance academic achievement.

A common saying is that we learn from our mistakes. Students need to know when they have made errors. Therefore, some negative feedback is necessary. However, it is very important that the student does not feel demeaned or criticized as a person when negative feedback is given. Consider these two contrasting examples of negative feedback:

> "Wrong again. You really oughta try harder. You can't learn if you don't try!"

> "Let's do this problem again togther. I'll give you some hints as we work through it. O.K.?"

The first instance connotes blame or criticism of the student, whereas the second example indicates a teacher willingness to help the student learn. Again, research indicates that teacher criticism is negatively related to student achievement.

There used to be a TV commercial for aspirin that showed an irritated and frustrated person with a headache saying, "Please! I'd rather do it myself!" Likewise, students need the opportunity to self-correct their errors or mistakes. In other words, they often want a chance to try to figure out and correct their mistakes themselves. This brings up two points: 1) Telling a student the right or correct answer immediately after an incorrect response may not be as effective in promoting learning as first giving the student an opportunity to self-correct the error. Giving a prompt following an incorrect response may be necessary if the student is having some difficulty. The key point is that we don't want to overly frustrate a student, but at the same time we do want to give her/him an opportunity to self-correct his/her errors. 2) Overdoing negative feedback can result in lowering of student motivation and self-esteem. Thus, if a student is making many different kinds of errors on a learning task, the teacher should ask, "Is this learning task too hard or too advanced for this particular student's skill level?" When there are many student errors on a learning task, the best strategy may be to show the student the correct answer and how to obtain it, and then plan subsequent learning activities which ameliorate those particular problems, should they persist. Then, provide positive feedback on correct student responses.

Academic questioning. Another type of direct instruction is soliciting student verbal responses during a discussion or recitation activity. Studies have indicated that students were more attentive when they were not sure who was going to be called on next to answer. When teachers addressed students in some predetermined manner (e.g., going down the row or around the circle), students tended to be less attentive. Thus, asking questions which are group-focused and then randomly calling on students helps to maintain student attention during a recitation or discussion.

Classroom studies have shown that, when teachers ask more low-level questions which are directly related to academic content, their students tend to make greater gains in academic achievement. Low-level questions are usually convergent—there is a right answer. They often involve recall of factual information or sequence of events, giving definitions, making discriminations or observations, giving or identifying examples of concepts, explaining simple cause and effect, etc.

Another good reason for conducting some group discussion or recitation in academic subjects is that it provides a change of pace from the worksheet and workbook activities frequently done in independent seatwork--i.e., student response modalities are varied from reading and writing to listening and speaking. Also, by listening to students respond you can directly monitor student progress and provide immediate feedback.

Academic explaining/modeling. Another component of direct academic instruction is explaining/modeling, which includes statements dealing with the content (e.g.,lecturing) and demonstrations of skills. In our study we found that, when teachers spent several minutes or more giving a planned explanation or demonstration during an activity (usually at the beginning), students were about five times less likely to perform poorly on the task than when little or no planned explanation was given. Verbal explanations of the substance of a task are especially important for mildly handicapped and disadvantaged students whose reading comprehension is poor.

Some studies have demonstrated that student reading accuracy is increased when the teacher reads the passage aloud before the students are asked to read the passage. Other studies have identified teacher clarity as being postively related to academic achievement. Thus, clear explanations or demonstrations which deal with academic substance are important. Obviously, to use your time efficiently, planned explanations or demonstrations should be given to the whole group, rather than repeatedly to individual students.

Even for certain kinds of independent seatwork activities, some explanation or modeling seems to make a difference. At the beginning of the seatwork activity, you can explain and/or demonstrate to the group how to do the first problem or two. Then, you can ask the students to try the next one or so, giving feedback to the group. Finally, students can do the remainder of the assignment on their own. This strategy is more likely to result in greater student task success than if you give directions only (e.g., "Turn to page 21 of your math book. Answer the first 10 questions. Write your answers on a separate piece of paper.").

In contrast to explanations and demonstrations planned ahead of time, one large study found that explanation based on immediate student need was negatively related to achievement in regular elementary classrooms. That is, giving more explanations in response to immediate student difficulties or misunderstandings of the task is associated with less academic growth. This implies that initial explanations were possibly unclear or absent, or that the task was too difficult for students to begin with. If you frequently find yourself repeatedly giving explanations to individual students who are experiencing difficulties with an assignment, this should tell you that something's not right. Perhaps the directions for the task were unclear, the initial explanation was inadequate, or the task is simply too hard in its present form.

On the other hand, these research results do not imply that you should not help students who experience difficulties with a learning task. But the findings do suggest that, when explanations based on immediate student needs are minimized, long-term student achievement tends to be higher.

Academic structuring/directing. Structuring/directing is similar to academic explaining/modeling. Structuring/directing occurs when the goals or objectives of a task are discussed, or the procedures to be followed in the task are given, whereas academic explanations or demonstrations deal with the content of the lesson itself. Research has shown that more structuring/directing is associated with greater academic achievement.

Teacher structuring/directing of seatwork activities was found in our study to be particularly important for minimizing low task success of mildly handicapped students. Since these students' reading skills are often poor, they are more likely to understand how they are to do an assignment if the teacher tells them the directions, rather than expecting them to read the directions.

Also, telling or reminding students of the purpose of a learning activity helps them gain perspective on why they are to do it, other than being required by the teacher or curriculum. As an example of structuring, a teacher might say, "Learning how to spell words correctly is important so other people will be able to read and understand what you write."

Summary. More direct instruction is associated with greater student achievement gains. Direct instruction includes academic:

- Feedback,
- Questioning,
- Explaining/modeling,
- Structuring/directing.

Direct instruction of groups is also related to high levels of student attention, compared to student attention during independent seatwork.

PROVIDE MORE OPPORTUNITIES FOR STUDENT HIGH TASK SUCCESS

One of the more important findings of a recent study was the positive relationship between student high task success on daily academic classroom activities and academic achievement. Student high task success means that s/he completes a task making very few or no errors (e.g., more than 80% correct responses). The more activities that are completed with high success, the greater the achievement gains. The converse is true as well: the more activities in which students perform very poorly (low task success), the less the achievement gains. This should not be surprising, since task success on classroom activities is simply a daily, task-by-task measure of achievement. So it makes sense that, if a student frequently performs well on classroom academic tasks that are related to content that is covered on an academic achievement test, we would expect him/her to do well on the achievement test.

This finding is also consonant with the concept of 'mastery learning'. The idea of mastery learning is that a student should get an 'A' on the test of attainment of an instructional objective before moving on to the next objective. It is true that some students will master an instructional objective faster than others, but this does not mean that the slower students should be denied the opportunity to master the objective as well.

Of course, we don't expect students to do all learning activities with high task success. When they are in the initial stages of learning a new objective, they will typically make mistakes and perform with medium task success (i.e., make some errors, but not all errors). As appropriate feedback is given, their task performance should subsequently improve on similar tasks until they perform consistently with high task success on that instructional objective. If some students often perform poorly on classroom learning tasks, this should tell the teacher something: the tasks may be too hard for those students. Another way of saying this is that the discrepancy is too great between the skills and knowledge required by the task and the present skills and knowledge of the students. One of the alarming findings in our study of mildly handicapped students was that they were observed to experience low task success in about 10% of the activities. That is, they did extremely poorly on about 1 out of every 10 tasks. On the other hand, normal students in another study were observed to experience low task success about 3% of the time (1 out of 33).

What can you do to increase high student task success and also decrease low task success? Obviously this is a hard question to answer, but research findings suggest several things teachers do:

- Becoming more familiar with students' skills and knowledge,
- Increasing frequency of classroom testing,
- Increasing direct instruction, especially planned explanations, demonstrations, structuring/directing and academic feedback to the group,
- Increasing the number of activities in which previously learned material is reviewed.

This list is only suggestive, clearly incomplete, and there is a good deal of overlap.

Becoming more familiar with your students' specific skills and knowledge. Research has shown that teachers who know their students better have classrooms with greater achievement gains. Teacher awareness of specific student skills and knowledge was measured in one study by having teachers predict ahead of time which items on an achievement test that each student would pass or fail before they were given the test. This finding implies that teachers who know their students better are also in a better position to select or create instructional materials that are well matched to student knowledge and skill levels. Thus, their students are likely to more often experience high success on classroom tasks and in the long run make greater gains in academic achievement.

Another source of information regarding specific student skills and knowledge is daily student worksheets. These worksheets provide up-to-date information concerning the students' understanding of instructional content. By simply reviewing patterns of correct and incorrect answers a teacher can obtain valuable information on specific student's strengths and weaknesses. This information, in turn, can be used to develop lessons that students can successfully complete.

Increasing frequency of testing. Studies have found that teachers who tested their students more often had students who experienced less low task success and more high task success. Testing students need not take up a lot of time and can serve two important functions: 1) It provides feedback to students on their learning progress; and 2) It provides feedback to the teacher on student mastery of instructional objectives. You don't need a lot of items on a test to find out whether a student has mastered an objective. For example, if you construct a test of just 5 items which are representative of the content covered by the objective and which are randomly selected, you can be pretty confident that students who get 4 or 5 of the items completely correct have mastered the objective. Of course, if you want to be more confident or you want to diagnose specific student problems, then you can increase the number of items. However, it doesn't take very many items to make a decision about student mastery, if the chances of student correctly guessing are low, and the items are representative of and randomly sampled from the content.

If intervals between tests are too long, then each test takes on more "importance" to the students and they may become more anxious about testing. On the other hand, if tests are given frequently and regularly, then each test becomes less "important"--i.e., if the students occasionally do not do well on a test it is not such a big deal, since they know they have many more opportunities to demonstrate mastery.

It is also obvious that teachers who test their students regularly and frequently are more likely to be attuned to individual student skills and knowledge. As discussed above, this teacher awareness is related to overall student achievement.

Furthermore, the very process of constructing a test (or selecting one from the curriculum) makes us consider just what it is that we want our students to learn--i.e., what our instructional objectives are. Making up a test for an instructional objective ahead of time helps a teacher to plan and sequence learning activities appropriate for reaching that objective. Worksheet content can be used effectively to develop highly appropriate tests of student progress.

Increasing direct instruction. This topic was covered in an earlier section in some detail, but bears repeating here. In our study we found that more direct instruction was associated with less student low task success. In particular, students were two to three times less likely to perform poorly on a task when teachers gave some verbal directions, planned explanation or demonstration and academic feedback to the group. If the activity was mostly independent seatwork, these three types of direct instruction usually occurred during the beginning of the lesson and lasted several minutes.

Increasing review lessons. In a review lesson students practice using skills and knowledge related to instructional objectives they have already mastered. Since they have mastered the objective and if they have not forgotten, they will usually perform the task with high task success. This is a straightforward way of increasing the amount of high task success in your classroom. It appears that "over learning" of materials is important for long term academic achievement. Obviously, review lessons should not be bunched up, but rather spaced at regular intervals over time. With mildly handicapped students, regular review seems to be particularly important, since they may be more prone to forgetting what they have learned.

One simple way to do a review lesson is to take an old test, and instead of considering it as a test, have the students do it as a review activity. Also, if you discover that some students have indeed forgotten, then you can plan some refresher activities for them. Since it is not practical to regularly review all material previously covered, you will need to decide which instructional objectives are most important and focus on those in your review lessons.

Summary. Students who more frequently experience high task success on daily classroom activities make greater gains in long term academic achievement. Things teachers can do to increase student high task success include:

- Becoming more familiar with students' skills and knowledge,
- Increasing frequency of classroom testing,
- Increasing direct instruction, especially planned explanations, demonstrations, structuring/directing and academic feedback to the group,
- Increasing the number of activities in which previously learned material is reviewed.

SUMMARY

Studies have shown that academic learning time is one of the most important determinants of student academic achievement. Academic learning time (ALT) includes the amount of time: 1) allocated to academic content areas, 2) students are engaged in academic tasks, and 3) students experience high success on those tasks. Based on the results of research studies, teaching strategies for increasing student achievement were recommended:

TO SPEND MORE TIME ON ACADEMIC SUBJECTS:

- Reduce transition time between activities,
- Decrease student misbehavior and time spent disciplining,
- Decrease student wait time during activities,
- Increase the amount of time scheduled for academic content areas.

TO EVOKE MORE STUDENT ATTENTION TO ACADEMIC TASKS:

- Praise students for appropriate behavior,
- Be "withit",
- Do more groupwork and provide more direct academic instruction,
- Provide a variety of academic learning tasks,
- Supervise academic seatwork activities more closely.

TO PROVIDE MORE DIRECT ACADEMIC INSTRUCTION:

- Increase academic feedback (especially positive feedback),
- Increase academic questions (especially low-level, convergent questions),
- Increase academic explanations and demonstrations,
- Increase academic structuring/directions.

TO PROVIDE MORE OPPORTUNITIES FOR STUDENT HIGH TASK SUCCESS:

- Become more familiar with students' skills and knowledge,
- Increase frequency and regularity of classroom testing,
- Increase direct instruction (especially academic explanations, demonstrations, structuring/directions and feedback to the group),
- Increase the number of activities in which previously learned material is reviewed.